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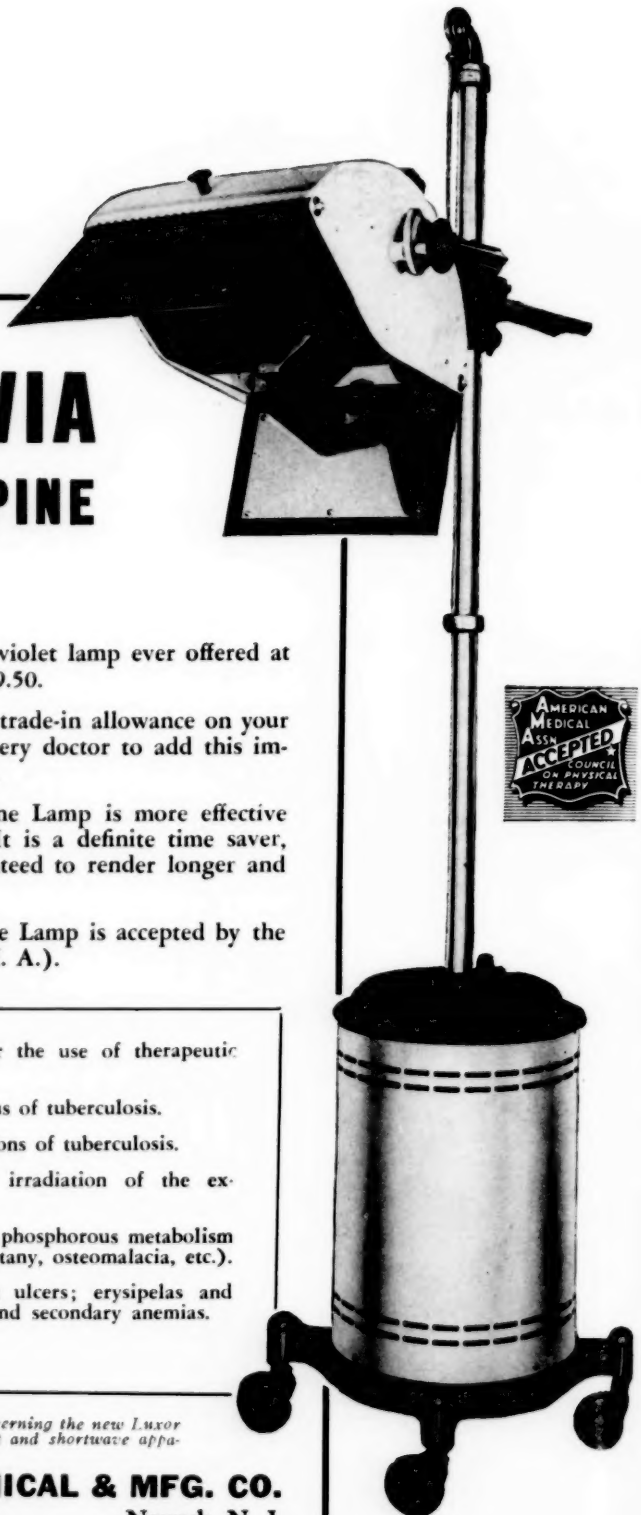

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CONTROVERSY ABOUT MEDICAL RADIO INTERFERENCE

It will be recalled that recently the Federal Communications Commission has issued statements that the use of certain electrical apparatus in medicine and surgery interferes with the transmission of radio waves for entertainment and formal, official communications, and that therefore, great restrictions are proposed which would seriously affect the medical profession. It will also be recalled that the greatest claim against the medical uses of the high frequency current emanated from the as yet incomplete television, although its value beyond that of an amusement character is still questionable and no doubt will require considerable development before its practical ability will be established. There is no question that the medical profession has in the past shown its patriotism and willingness to support the Government whenever the services of physicians and surgeons were needed. Beginning with the Revolutionary War down to and including the World War the profession has sacrificed its own interests in order to render efficient service to the sick and wounded in the Army and Navy of the United States, and to preserve the health of the civilian population at home. The Government knows that in the event of another emergency the medical fraternity as a body will prove available for any service it may be called upon to render in the interest of the nation's sovereignty.

The situation is entirely different when an official body makes demands on the medical profession, demands calling for sacrifices in the interest of certain commercial enterprises, and this during times of peace when all concerned problems can and should be solved on the basis of greatest interest to the weal of the nation. One would imagine that our Army and Navy who have the serious task of defending our national independence would be the very first among the public services to take appropriate measures to overcome any interference with radio communication which is so essential for national defense. But as a matter of fact communications from the Surgeons General of these public services advise us that they have either had no complaints at all or such too insignificant for official cognizance or action. If anything, at least one such bureau expressed a desire officially to co-operate with the medical profession in the matter of alleged interference with radio communication by the use of certain medical apparatus in governmental hospitals and therefore also civil hospitals and physicians' offices. This offer was made in writing to the Committee of the Congress charged with the duty of obtaining proper action on the part of the proper Federal body.

No less significant and important is a formal statement made to this Committee by Mr. F. W. Cummiskey of the Electrical Research Products Corporation, of New York, to the effect that interference from medical diathermy apparatus amounts to a mere 7.5 per cent of the total time lost by all manners of such interference. Under the circumstances the medical profession must remain aware that with due respect for the aims and objectives of the Federal Communications Commission, this body is concentrating its antagonism upon a source that is least important when compared with other industries and activities affecting radio communication. Considering the services rendered the nation in the nature of relief of human suffering and invalidism with its financial losses to and burdens upon the State, the medical profession is fully justified in demanding fair play and impartial, nay, even special consideration on the part of any and all branches of the Government, especially when not only the interests of certain groups but the weal of the entire nation are at stake.

For this reason we publish the following report by the Committee of the American Congress of Physical Therapy which has made repeated efforts to convince the concerned authorities of the great need of peaceful and harmonious cooperation between the medical profession and the various industries, and the

avoidance of any arbitrary measures which would place great burdens upon a considerable part of our population at a time when there is no real need for autocratic intervention. There is all the more reason for these efforts of the Committee because should the Federal Communications Commission be empowered to enforce its biased convictions upon the medical profession, it would mean a tremendous material and moral burden placed upon the shoulders not only of physicians and surgeons but upon manufacturers of certain apparatus, and above all upon countless sufferers in need of some form of electrotherapy. The following report should therefore not only be read with care and understanding but result in a mobilization of the entire medical body in the interest of preserving its freedom to administer to the needs of the sick and injured according to the best methods available. — EDITOR.

REPORT OF COMMITTEE ON RADIO INTERFERENCE BY HIGH FREQUENCY CURRENTS *

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The President of the American Congress of Physical Therapy, Dr. Frank H. Krusen, on September 24, 1938, appointed the following Committee on Radio Interference: Drs. John S. Coulter, *Chairman;* William Bierman, K. G. Hansson. This Committee from the time of its organization to the present, worked with the thought in their minds which was expressed by Dr. Krusen: "Any curtailment of the use of these high frequency electrical energies in the treatment of disease would cause great hardship to many sufferers and would even prevent the saving of many lives."

This Committee arranged a preliminary meeting with the representatives of various medical associations and manufacturers of short wave diathermy apparatus on January 8, 1939, at the Waldorf Astoria Hotel, in New York, for the informal discussion of the problems to be considered in the meeting to be held January 9, with the representatives of the Federal Communications Commission.

The Committee communicated with the American College of Surgeons, the American Urological Association, and the American Hospital Association. These organizations agreed to send representatives to this meeting, and to the one on the following day with the representatives of the Federal Communications Commission. The Committee has continuously worked with the Council on Physical Therapy of the American Medical Association and the manufacturers of short

* Committee Report Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 5, 1939.

wave apparatus, and these organizations also had representatives at this preliminary meeting.

On January 9, at the Harkness Theatre, Columbia University, a meeting was held with the representatives of the Federal Communications Commission. The American Congress of Physical Therapy was represented by Drs. Frank H. Krusen, Richard Kovacs, William Bierman, Norman Titus, K. G. Hansson; the Council on Physical Therapy of the American Medical Association by Drs. Horatio Burt Williams, A. U. Desjardins, Frank H. Krusen, Anthony C. Cipollaro, and Mr. Howard A. Carter; the American College of Surgeons by Drs. Malcolm T. MacEachern, Frank E. Adair and George Hoyer; and the American Hospital Association by Dr. W. P. Merrill. Most of the manufacturers had representatives present.

At this meeting Dr. Krusen stated that he felt he voiced the opinion of all the physicians with whom he had talked when he stated that it was their desire to co-operate to the utmost in any plan for preventing radio interference. Attention was called to the fact that high frequency electrical currents were used in medicine long before they were used for communications. It was shown that the proper employment of medical diathermy might reduce the period of convalescence in certain diseases and injuries, thus lessening the cost of medical care and returning the patient to his occupation in shorter time. Still more important, both in medicine and in surgery, diathermy might save lives. Were these life-saving measures to be weighed in the balance with undeveloped forms of home amusement? Mr. Jett had mentioned that services on the bands assigned to television "were too important to be interfered with." Dr. Krusen wanted to know what was more important than the life and health of the nation. Mr. Wilmotte, representing the National Association of Broadcasters, stated during the morning session that interference with radio programs was "not particularly pleasant." Dr. Krusen pointed out that death was much more unpleasant. Mr. C. B. Hanson, Chief Engineer of the National Broadcasting Company, mentioned that physicians might have an irate public complaining about diathermy interference with television. Dr. Krusen felt that it was better to have many irate persons than one dead person who might have been saved by the use of electro-medical devices. It was pointed out that in Europe the physician was given first consideration in matters of radio interference, and he who complained of interference from electro-medical apparatus paid the cost of controlling it.

Dr. Frank E. Adair, Executive Officer of the Memorial Hospital, American Society for the Control of Cancer and Chairman of the Committee on the Treatment of Malignant Diseases of the American College of Surgeons, stated that the use of electro-medical apparatus is increasing at a very rapid rate. He felt that it is absolutely necessary that proper provisions be made by Federal authorities to continue the use of many types of electrical apparatus so important to the general health of the nation.

Dr. George Hoyer, Head of the Department of Surgery at the New York Hospital, pointed out that in surgical treatment of such conditions, electrical treatment of patients in the operating room has been of enormous advantage.

Dr. W. P. Merrill of the American Hospital Association, stated that any requirement which increases the cost will either decrease the amount of hospital care given to those unable to pay or make the hospital find some new source of income to pay for it. The patient who is acutely ill in bed must be treated in bed and some of the treatments now specify fifteen minutes per hour for every hour of the day and night. In such cases, the patient cannot be taken to any suggested screened or shielded room. Dr. Merrill stated that the manufacturers had informed him that crystal control would increase the present cost of the

equipment from 200 to 300 per cent. This cost, he said, would eventually have to be borne by the patient.

Dr. Anthony Cipollaro of Columbia University, said that some of the malignant diseases that appear in the mouth, nose, lips and sinuses can be treated successfully only with electro-surgical currents. It is therefore essential that no limitations whatsoever be placed upon the surgeon or dermatologist who treats such serious conditions as cancer. Thus, it is obvious that any interference with equipment that is necessary for the treatment of diseases may lead to disastrous results.

Dr. A. U. Desjardins of Mayo Clinic, drew attention to the fact that, if the Federal Communications Commission were to make an arbitrary requirement that all diathermy equipment should include crystal control, or that interference be eliminated by efficient shielding, this would involve a tremendous increase in cost of apparatus and in the cost of using the apparatus for medical purposes. In connection with hospitals particularly, the cost of shielding any considerable number of rooms or all the patient rooms in the hospital would constitute a tremendous hardship on many such institutions, which even now are struggling to make both ends meet, and sometimes do not succeed. However, such action would necessarily involve an increase in the cost of medical care, which the medical profession has long been struggling to keep down to as low a level as is possible.

Dr. L. P. Wheeler of the Federal Communications Commission, stated that from an engineering standpoint, the solution of the problem is easy. While economic factors are important, they are not of such great importance as to be regarded as being unreasonable from the standpoint of cost to the users of therapy apparatus. For example, there are now on the market various types of thin sheet metal, such as aluminum and copper, relatively cheap, which make the cost of suppressing radiation quite reasonable. In those cases where it is necessary to take the apparatus to the patient, in circumstances where screening is not advisable economically, or for any other reason, entire screening of the patient and the apparatus is not possible, it would appear that the only solution would be to use apparatus with a restricted frequency band of emission which does not extend over more than one communication channel. Great care should be exercised in the selection of the channel to make certain that no interference will result to radio reception. The apparatus should be constructed to operate with a frequency tolerance of not more than 0.05 per cent.

With the cooperation of the Editor, Dr. Disraeli Kobak, there was published in the ARCHIVES OF PHYSICAL THERAPY in May, 1939, "The Medical Viewpoint of Interference to Radio Reception by Electro-Medical Equipment." Reprints of this article are available.

During the meeting of the American Medical Association in St. Louis, May 16 to 18, the manufacturers of electro-medical equipment held two meetings. At these meetings the subject of radio interference by electro-medical equipment was discussed. Some manufacturers were inclined to do nothing, and nothing constructive was done on this problem at these meetings.

Your Committee realized that the manufacturers of short wave equipment were not aggressively working on the problem, that the radio manufacturers were carrying a campaign in the newspapers to blame most interference on electro-medical equipment, and that a bill might be introduced into Congress this session, as it was in the last session, to increase the powers of the Federal Communications Commission.

Therefore, on May 25, 1939, your Committee voted:

1. That we present our side of this problem to the Congress of the United States by requesting each member of the American Congress of Physical Therapy to write his two senators, his representatives at large, and his district representative a letter explaining the matter and enclosing a reprint of the ARCHIVES article.

2. That we ask each member to write the manufacturer from whom he bought his equipment a letter asking what action they are taking in this matter to protect the physicians' interests.

Your Committee recently has received evidence that the Federal Communications Commission has not changed its attitude toward our problem. On June 13, 1939, Mr. Fred Hovey, Secretary of the American Surgical Trade Association, wrote to Mr. Jett requesting a definite statement as to plans of the Federal Communications Commission with reference to regulation of electro-therapeutic apparatus, in order that it might be transmitted to the interested parties.

Mr. Jett, Chief Engineer of this Commission, wrote to Mr. Fred Hovey on June 16, 1939, as follows:

> Our interest is with respect to the engineering features of the design and installation of diathermy apparatus. We would not be concerned with the use of equipment provided it meets the standards of good engineering practice, *both as to design and installation which among other things would include frequency stability and adequate shielding both of the apparatus and the room in which it is operated.* I cannot too strongly emphasize that these features do not in any way detract from the benefits which may be derived from such apparatus when treating patients. In other words, as pointed out in the Inter-American Arrangement Concerning Radiocommunication, signed at Havana, Cuba, on December 13, 1937, 'The use of such apparatus has an important place in therapy, surgery, industry, etc., but the radiation of radio energy is not essential to the proper functioning of the apparatus and can be prevented or controlled without impairing the usefulness of the apparatus for its intended purpose.'

Your Committee notes that Mr. Jett wants "frequency stability and adequate shielding both of the apparatus and the room in which it is operated." At the request of interested members of the American Surgical Trade Association, Mr. Hovey wrote Mr. Jett asking him for more complete information with reference to two terms used in his letter of June 16; namely, what he meant by "frequency stability" — what margin, plus or minus, from a viewpoint of stability would be satisfactory to the Federal Communications Commission. Further information was requested on what was meant by "adequate shielding" — what formula of interference that would be tolerable and satisfactory to the Federal Comunications Commission. Mr. Hovey set forth the fact that this information was desired by certain manufacturers in order that it might be a guide to them in their research and experimentation.

The following reply was received from Mr. Jett under the date of August 29:

> In your letter of July 26th you requested clarification of the terms 'Frequency stability' and 'adequate shielding' for members of the American Surgical Trade Association manufacturing diathermy apparatus.
>
> The term 'frequency stability' as applied to a radio transmitter has been defined as the ability of the transmitter to maintain at a given value a given carrier frequency.
>
> It is usually expressed as a percentage deviation within which the operating frequency is maintained. This definition agrees with common practice which uses the term 'stability' to describe a quantity which should logically be called 'instability.' A definition which I like better and one more appropriate, I believe, is as follows: 'The frequency tolerance of a radio transmitter is the extent to which the carrier frequency of the transmitter may be permitted to depart from the frequency assigned.' Here again the tolerance is expressed as a percentage of the assigned frequency. The above definition is taken from the report on Standards for Transmitters and Antennas, 1938, published by the Institute of Radio Engineers.
>
> A 'carrier wave' is usually referred to as the sinusoidal component of the useful part of a modulated wave whose frequency is independent of the modulated wave and the carrier frequency is the frequency of a carrier wave.
>
> In assigning the tolerance that must be maintained by the various classes of radio stations, the United States is bound by international regulations and a table of tolerances as now applied will be found on page 161 of the General Regulations appended to the International Telecommunications Convention of Cairo, 1938. The tolerances specified in this table depend upon the frequency band and the class of station. For all fixed stations

with new transmitters installed beginning January 1, 1940, within the band 1500-30,000 kilocycles the tolerance is 0.01 per cent of the assigned frequency. This means that a station assigned the frequency 12,000 kilocycles, for example, would be permitted to deviate 1.2 kilocycles either side of the frequency of operation. If the Commission were to assign special frequencies for use by diathermy stations it is my belief that they would have to be in conformity with those specified by international regulations.

The question of a rigid definition of the term 'adequate shielding' for diathermy apparatus is somewhat more difficult. Conditions vary so widely in different parts of the United States as to available signal strength in the various services, character of the services, the proximity of receiving centers to the sources of disturbances, etc., that it has appeared impracticable to lay down any hard and fast rules with respect to the actual strength of the signal field to be permitted at various distances or the noise levels to be tolerated. To do so would undoubtedly work unreasonable hardships in certain locations and at the same time render the rules inadequate for the purpose in others. By 'adequate shielding' we mean shielding which will prevent interference under normal conditions and circumstances. The amount of shielding required will vary of course, depending upon the location. If diathermy apparatus is to be operated at a hospital, for example, in close proximity to a large receiving center for international communications or very close to an airport, the amount of shielding required to prevent interference would be considerably greater than that in a rural area. In the case of diathermy apparatus which we will say is to be sold to the public without any engineering on the part of the selling agency with respect to the site and installation of the equipment, then by 'adequate shielding' it is meant shielding which will prevent interference to radio reception at reasonable distances under somewhat worse than average conditions.

Dr. L. P. Wheeler (Chief of Technical Information Division of the Engineering Department of the Federal Communications Commission) in his address at the meeting of January 9, 1939, indicated that in order to be acceptable to the Commission the margin, plus or minus, of frequency tolerance or stability would have to be of such narrow band as to, in the opinion of the Committee, make the original cost and subsequent service of the installation of short wave diathermy equipment so excessive as to eliminate them, except in a few large hospitals. The same holds true in the opinion of the Committee from a viewpoint of the formula indicated by the representatives of the Commission at a previous meeting held in Washington, D. C. as being acceptable to them from a viewpoint of interference tolerance from a shielded machine.

Dr. Normal S. Case, Acting Chairman of the Federal Communications Commission, wrote to Senator Gerald P. Nye on July 7, 1939, and to Senator P. N. Brown on July 18, 1939, exactly similar letters, a paragraph of which follows:

It will be noted that the Commission's representative enphasized the fact that diathermy apparatus has an important place in therapeutics, surgery, industry, et cetera. It is a well known fact that the radiation of radio energy is not essential to the proper functioning of the apparatus and can be eliminated or controlled without impairing the usefulness of the apparatus for its intended purpose. There has never been any attempt on the part of the Commission to suppress the use of this important device; however, since both services, i.e., radio and medical, involve the use of equipment in connection with the safety of life and property, and *since the radiation of energy from the electro-medical apparatus can be controlled at small cost by screening the room in which such apparatus is used, it is felt that the interested parties should cooperate and give serious thought to the adoption of standards of good engineering practice which will permit both services to operate without mutual interference.*

It is noted that Mr. Case's replies to the Senators are apparently form letters. The statement is made in these letters "since radiation of energy from electro-medical apparatus can be controlled at small cost by screening." Your Committee believes that screening of operating rooms and treatment rooms in hospitals and offices cannot be done at a small cost.

In a legal opinion on the authority of the Federal Communications Commission, Russell, Murphy and Pearson of Chicago state:

We do know, or at least it does not appear, from the investigation and examination we have been making that the Federal Communications Commission has as yet sought to bring any action against short wave diathermy or other similar machines which cause interference. We are of the opinion that the Federal Communications Commission would

first be desirous of having additional legislation before proceeding to take any steps against such alleged interference.

The Committee has some evidence that the radio manufacturers could limit interference themselves by the use of a frequency modulated radio devised by Major E. H. Armstrong of the Department of Electrical Engineering of Columbia University, New York. Major Armstrong states:

> If the frequency modulation system were used universally and if the Federal Communications Commission would eliminate its rule restricting the broadcaster to 1 kilowatt power, I believe it would be possible to get along with much less shielding than is going to be necessary under the present conditions. I have already brought this matter to the attention of the Commission and it is possible that they may reconsider some of the restrictions now in force. As Dr. Williams states, as soon as the public hears of the type of transmission which my system will give I am satisfied that the obstacles which have been placed in the way of its development will be removed by the force of public opinion and the problem will become less acute than it is at present. However, from what I have learned from Dr. Williams and from my own observations it seems to me that some form of shielding will be necessary. I am inclined to believe that it may be possible to confine it to the machines, their leads and to the patient and that possibly a complete shielding of the room may be dispensed with.

This Committee therefore believes:

1. That it has followed the right course from the time of its organization to the present, in working with the thought in mind which was expressed by Dr. Krusen: "Any curtailment of the use of these high frequency electrical energies in the treatment of disease would cause great hardship to many sufferers and would even prevent the saving of many lives."

2. That in the prevention of interference, screening will involve costs that would curtail the use of diathermy equipment, because, in spite of the Federal Communications Commission's statement that screening can be done at small cost, this cost will be excessive, for the reason that in some hospitals and offices it would be necessary to screen many rooms. Furthermore, it is believed that to have effective screening, considerable engineering consultation would be required.

3. That crystal control not only involves tremendous increase in the cost of short wave diathermy equipment but involves a question of service for these that is not available to a great number of the physicians who use this equipment.

4. That either screening or crystal control would cause a great hardship on present users of short wave diathermy who purchased these machines in good faith.

5. That, from the viewpoint of its use in furthering the relief of human suffering, it would be extremely grave to have the employment of short wave diathermy greatly restricted by the enforcement of regulations requiring either screening or crystal control. It feels that those who advocate such burdensome restriction on the medical profession, be they manufacturers or others, are not keeping in mind and promoting the interests of the large number of physicians who are accomplishing so much good with this aid in their practice.

6. That it is apparent that the opinion of the Federal Communications Commission has not been altered and restrictions would be imposed, which would cause great curtailment in the use of diathermy equipment.

7. That the manufacturers of radio equipment and short wave diathermy apparatus are now devoting much effort to the solution of this problem and that they can and will improve their machines so that radio interference will be lessened. This will be accomplished with developments in both fields. Regulations by legislation may interfere with this progress, and impose unnecessary expense on the medical profession.

8. That it has not been proven to the satisfaction of this Committee that the amount of radio interference that is produced by short wave diathermy

apparatus operated under clinical conditions, is as serious from the viewpoint of interfering with useful radio communication as it at times may be pictured.

9. That even if there were a certain rather substantial amount of semi-serious inconvenience caused by short wave diathermy to radio communication, it is its opinion that the far-reaching humanitarian factors are so important in the public interest that any such interference from time to time should be perpetually tolerated by the communication interests, as a contribution to the general welfare, in return for the valuable franchises which the government (therefore, the people) have granted to these communication interests. It strongly believes in the powerful inherent rights of the public to receive benefits from short wave diathermy equipment in the hands of the medical profession.

This Committee therefore recommends:

1. That members of the American Congress of Physical Therapy be urged to continue in their efforts to call to the attention of their senators and representatives in Congress that the medical profession is opposed to legislation giving the Federal Communications Commission power to compel users of diathermy equipment to meet the standards of "frequency stability and adequate shielding both of the apparatus and the room in which it is operated" unless these standards are stated by the Commission, and unless these standards are such as not to impose such costs or restrictions as to curtail the use of the high frequency currents in the treatment of disease.

2. That manufacturers of short wave diathermy equipment be urged to cooperate with us in solving this problem.

3. That the cooperation and financial assistance of all manufacturers of short wave diathermy equipment including the Physical Therapy Manufacturers Group of the American Surgical Trade Association, be sought to institute a program of research, taking advantage of the capabilities and facilities of the Research Foundation of Armour Institute of Technology, and having the following definite objectives:

(a) Investigation of records and literature of governmental and private agencies supervising or interested in radio interference with short wave diathermy equipment and an analysis made for accuracy of statement.

(b) Determination of interference which exists with presently employed radio communication by short wave diathermy equipment when operated under actual service conditions.

(c) Determination of the most common sources of interference of short wave diathermy with radio communication and their relative ranks as to both intensity and frequency of occurrence.

(d) Determine factors involved that contribute to the production of interference to radio communication by short wave diathermy.

(e) Determination of means of controlling these factors in order to minimize interference.

4. That the American Congress of Physical Therapy appropriate $300.00 to aid in a program of research to determine the amount of radio interference by short wave diathermy machines operated in treating patients.

FURTHER DEVELOPMENT OF PHYSICAL THERAPY *

WILLIAM H. SCHMIDT, M.D.

PHILADELPHIA

The gratifying progress in physical therapy in the last few years has been due largely to the ability and forethought of a few of the early workers in this field. These men have left a lasting imprint that will be an inspiration for future students and practitioners. The moment is therefore opportune to pay reverential tribute to those departed pioneers who have given their best efforts and have served as an inspiration to the present leaders in American physical therapy. Their names though not legion are numerous, and as a tribute to them we recall a few who have occupied a foremost place in the development of this discipline toward its present state — Morton, Baruch, Granger, Snow, and Clark. No less credit is due to a number of those who are still with us and are earnestly and valiantly devoting their best talents to the continuous advancement of our particular branch of medicine. The history of physical therapy is a splendid record of the trial and error method initiated by primitive means and concepts which has grown to its present state based on a scientific foundation that parallels the scientific achievements in other fields.

Yet where there is much light there is also shadow. It lies in the scheme of incompleted organization that undesirable and unqualified elements — opportunists and pseudo-medical adventurers — should exploit the labors of others by illicit and unethical competition. As long as physical therapy is not receiving the protection of the civic authorities that is accorded the practice of pharmacotherapy and surgery, that long will unscrupulous individuals find a back door entrance to a field without first acquiring the rigid qualifications for scientific and ethical practice. This is a problem which organized medicine is still attempting to solve, for which there is need of full and dignified co-operation on the part of all who are vitally interested in the establishment of physical therapy as an integral part of medical practice.

Undergraduate Instruction

Among the problems that have to be solved in the immediate future, the training of our medical students looms large as a means of building a future devoid of certain shortcomings of today. Like every other human activity involving the interests of our communities, physical therapy needs a comparatively large number of capable disciples without whom the efforts of a few, be they ever so able, cannot adequately meet the needs of everyday practice. While most of the outstanding schools teach physical therapy, it is regrettable that there are still a few that do not include this discipline in their curriculum. There are some in which it is only a voluntary course, and others in which it is taught in conjunction with associated subjects, such as radiology, or given an occasional mention in lectures on medicine or surgery. We should not be satisfied until physical therapy is an obligatory course in every medical school with a minimum of 10 lectures in the junior and practical demonstrations in the senior year. Those of us who have been teaching this subject for the past few years are conscious of an awakened interest and desire by most medical students for additional instruction in physical medicine. We hope the future generations of physicians will be so

* Presidential Address Delivered at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 5, 1939.

well grounded that the problem of post-graduate instruction will have resolved itself into the routine scientific instruction obtained from county medical societies and national conventions where new developments in physical therapy will be considered.

Before this ideal can be reached we must recognize the present situation and our own responsibilities. It is clear that before a subject can be taught we must have men who are qualified to teach. The excuse given by some schools is that they cannot find competent instructors in this branch of medical practice. It is therefore logical that efforts should be made to create an interest in physical therapy among progressive young medical men through the formation of special post-graduate courses and, more important still, by the establishment of fellowships in recognized institutions to qualify men to teach and direct departments of physical therapy in large hospitals. It is unfortunate that at the present time there are only a few such opportunities available. I urge that a complete list of such fellowships should be published from time to time in our official publication to serve as a stimulus and a guide.

Exploitation by Hospitals

The important problem of the physical therapy department in the hospital deserves close attention because unfortunately it is often being exploited for the benefit of the hospital and at the expense of the profession. It is a known fact that many hospitals today are in competition with practitioners of various specialties. As a result of this short-sighted institutional program, physical therapy departments in many hospitals are under the direction of technicians for the purpose of appropriating to their own profit the income from such departments. It is unfortunate that there is a tendency for this practice to spread, and it is therefore the duty of organized medicine to discourage such comercialization and to stress the need of adequate control of these departments by competent physicians. It should be obvious to any farsighted individual that if this highly unjust state of affairs is not remedied without undue delay, there will result a situation comparable to the killing of the goose that laid the golden eggs. Young physicians will be robbed of the incentive to enter our specialistic field because of their inability to compete with unqualified persons employed at a remuneration commensurate with their lack of worth. Nor can anyone wish to be exploited by powerful institutions as consultants without the material reward accorded other specialists.

The practice of physical therapy is the practice of medicine and requires the same degree of training as any other special field. It is important that such a department be operated under competent medical direction, because most of the patients referred are not sent with a request for a definite type of treatment but the treatment is left to the judgment of the physician in charge. This is as it should be, and it certainly stands to reason that a lay person cannot evaluate the indications and the dangers which may be attached to the various types of treatment, hence is not competent to prescribe treatment. Here again, we have a great responsibility, because it is true that today there are not available enough qualified men to take charge of such departments in all hospitals. If we do not correct this abuse as quickly as possible we will find physical therapy drifting to the laity not only in the hospital but in private practice on the outside.

Our position on this problem is secure, because hospitals or unlicensed lay persons are not permitted to practice medicine and the prescription and direction of physical therapy is distinctly the practice of medicine. It should be the ambition of every well established department of physical therapy in

a hospital to facilitate the training of young graduates and to encourage them in becoming specialists. These departments should also be a source of authentic information on technics and indications for the treatment of definite conditions.

Research

Research is one of the definite needs in physical therapy and presents one of the richest fields for investigation. There are many problems as to effects, dosage, standardization of the various methods that would be aided by their scientific development. A splendid example has been set by the Johnson Foundation at the University of Pennsylvania, which has recently been endowed one million dollars to encourage and facilitate research in physical therapy. Other minor foundations have been established, and we should not miss any opportunity in securing additional donations for such important purposes.

The American Medical Association has recognized the need for some definite rules and regulations for the recognition of specialists in the various departments of medicine. As a result we have a number of special examining boards to certify to the ability of qualified men in their respective specialties. This is a great benefit in more ways than one. The public is protected and can seek treatment from men who are recognized as particularly qualified. It is also a protection to the profession, because it enables qualified men to establish a reputation without having to meet the competition of self-styled specialists.

While physical therapy has as yet not been so recognized, the time has arrived when special recognition is not only desirable but justified, and an organized movement is already under way to secure such endorsement by the American Medical Association. This will serve to set up in the various hospitals departments directed by men properly qualified in this field with facilities for the development and training of younger men. It will also offer a reference list to enable anyone in any part of the country to obtain the names and addresses of duly qualified men in any other city to whom they can refer patients in need of specialistic aid. The exact qualifications and the organization of such authoritative body requires careful consideration and, no doubt, in a short time definite plans will be formulated for the attainment of this object.

The increased use of physical therapy has been so rapid in the past few years that the number of trained workers has not kept pace with the demand. The result is that one finds many technicians who are poorly qualified and actually directing the operation of departments. This situation may be due to the fact that we do not have enough nor adequately equipped schools for physical therapy technicians. It is true that the American Medical Association has made an effort to standardize such schools and has published a list of qualified institutions. This recognition has not been thorough enough. There are schools listed as qualified to train physical therapy technicians that do not even provide an adequate course of instruction. There are other schools whose training is far superior but whose course for legitimate reasons has not been recognized by the American Medical Association. We must admit that the ideal is being sought and that the American Medical Association is working along the proper course. We should therefore as a body assist this effort in every way to remedy the situation and set up proper regulations.

The question of licensing physical therapy technicians is an important one, because some states require licenses while others do not. Here again,

we find difficulty with recognition of properly qualified schools as each state has set up a standard of its own. A national examining board would be the best solution and would overcome many of the complications we have to contend with at the present time.

The Technicians' Board of the American Congress of Physical Therapy is a step in the right direction and serves to overcome the difficulties encountered in the various states in the Union. The advantages of this board are many. It enables a physician seeking technical assistants to know whether he is dealing with a qualified person or not. There are many states in which no schools exist and, therefore, it is necessary to obtain technical aides from distant localities. There is also an advantage to the technicians themselves, because they will be placed in a special class and their credentials will be recognized anywhere in the United States, thus enabling them to secure more advantageous positions.

Postgraduate Instruction

The question of postgraduate instruction is also one which must be considered. There are many physicians practicing today who in their medical course have had no training in physical therapy. Our offices are daily besieged by salesmen who are endeavoring to interest us in apparatus of various types. They manage to induce physicians to invest in apparatus without being familiar with their various indications and technics. Without such a knowledge and with the indiscriminate use of apparatus it is but natural for the therapeutic results to be unsatisfactory if not downright harmful. As a result many come to believe in the uselessness of a therapeutic method that in the hands of competent men has proved of inestimable value. This does not reflect on the salesman as on the lack of knowledge of the untrained physicians.

The older physicians recognize the need of instruction in physical therapy. For many years so-called intensive courses were given by commercial firms. In recent years this has not been so conspicuous, probably because of the objection by the medical profession to the commercial background of such instruction. It stands to reason that any man who is interested enough in physical therapy to purchase apparatus should have sufficient interest to secure instruction in the use of that apparatus from a proper source.

It should be the policy of every physical therapy department in every hospital to welcome physicians who are interested in observing the results of treatments and to demonstrate the technics so that they may derive accurate information. There are many men who are not sufficiently interested in physical therapy to apply it themselves and, therefore, do not desire special instruction. Every physician, however, should know the value of physical therapy and the conditions for which it is indicated.

Our national associations do not reach such individuals. It is therefore necessary that this information be brought to them through the county medical society and the state medical society and other organizations which are attended by the general practitioner. Every state and every county medical society should have a committee on physical therapy to see to it that properly qualified men appear on the program.

If the subject is one in which physical therapy is of value, a paper on such treatment should be read by a qualified man. If the subject is not of such importance that a special paper is indicated, arrangements should be made to have qualified men discuss it from the physical therapy standpoint.

The ARCHIVES OF PHYSICAL THERAPY has established an enviable position as our official journal. It has done much to advance the cause of physical therapy and therefore merits our continued help and encouragement. Since perfection is its aim, every effort should be made to improve the quality of the papers submitted for publication. Articles prepared in co-operation with recognized clinicians are helpful, as they obviate bias on the part of the physical therapist, and are therefore more favorably received. Articles in the state medical journals are another valuable contribution because they reach general practitioners most in need of information on physical therapy subjects.

In view of the tragic turn in world events we should organize our affairs to co-operate with the Government in every way possible. Preparedness is an aid to efficiency and I believe this society should appoint a committee to carry out any program our Government may have in mind. While we must be prepared, we devoutly pray that we may continue to practice and advance our profession in peace with good will to all men.

PRESENT STATUS OF EDUCATION IN PHYSICAL THERAPY *

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CHICAGO

The oldest field in medicine has in the past few decades emerged as one of the newest. The scientific application of physical agents in medicine has slowly passed through the formative period of trial and error. The principles which could be taught were gradually evolved from learning by experience. As the fundamentals increased in number and were gradually co-ordinated, the basis for the development of a new profession became firmly established.

The evolution of education in physical therapy has followed patterns similar to those in other types of education. This is a process characteristic of all institutions that are destined to become permanent.

The establishment of a permanent Council on Physical Therapy in the American Medical Association and the more recent official recognition of the American Congress of Physical Therapy as a special society are alone sufficient to indicate the present status of the specialty.

Education in physical therapy has progressed and will continue to do so. Therefore, I should like briefly to review what has been done and what is being done in the teaching of this branch of medicine. It may be seen at once that medical schools, internships, residencies and graduate courses are involved in the more or less formal methods for training physicians in physical therapy. Outside of teaching institutions, county and state medical societies and the medical journals are most important instrumentalities for

* Read before the Western Section of American Congress of Physical Therapy, Los Angeles, June 9, 1938.

progress. The education of technicians, also of the utmost importance, will be discussed.

Undergraduate Training

This period includes premedical courses in physics and biology as required for admission to an acceptable medical school. Here physical principles should be so taught as to show their biologic applications. This may be done through the proper selection of experimental and illustrative material.

The Committee on Education of the Council on Physical Therapy has said that "adequate education in this field of therapy can be brought about only by long range planning in respect to undergraduate education as a whole." It has been further pointed out: "The situation as regards the use of physical therapy among the practicing profession as a whole throughout the United States is, however, nothing short of deplorable. Large sections of society are at present wholly without advice, not to say practical assistance, concerning measures which often spell the difference between invalidism and health."

There can be no question that there is a definite need for more and better undergraduate instruction in physical medicine in the majority of approved medical schools. The crowded medical curriculum of today may not permit the insertion of the desired amount of training in many cases; but even though the student does not become thoroughly familiar with all the basic qualities and technics, he may be taught the indications and the limitations of the use of physical therapy agents.

Dr. Franklin P. Lowry, a member of the consultants' group to the Committee on Education of the Council on Physical Therapy, submitted in 1937 a report (table 1) containing the results of a questionnaire that was sent to sixty-six medical schools in the country. This was a comparison of the courses in physical therapy offered in recognized medical schools in 1931 and 1936.

TABLE 1. — *Courses in Physical Therapy Offered in Recognized Medical Schools*

	1931	1936
Required	22	31
Elective	5	5
Required and Elective	2	6
X-Ray Only	13	....
*In Conjunction	17	23
No Course	4	1
No Reply	3	....
	66	66

Medical schools in which courses in physical therapy are mandatory increased 50 per cent and those offering instruction in conjunction with other courses, about 35 per cent. Training is required, elective or given with other courses in sixty-five of the sixty-six schools studied. While the quality and amount of this training may vary greatly, it is apparent that many more schools are now, for the first time, making conscientious efforts to improve this important phase of the curriculum. The summary indicates a wholesome general trend in undergraduate teaching.

Closer co-operation now exists between the Committee on Education of the Council on Physical Therapy and the medical schools through individual

* Various aspects of physical therapy are taught in conjunction with other courses — dermatology, orthopedics, etc.

efforts to add courses in physical therapy to the medical curricula. An outline of lectures to be used in teaching physical therapy has been adopted by the Council for presentation to deans of approved medical schools when they desire such information. The "Handbook of Physical Therapy" was adopted as the text.

Internships and Residencies

Relatively few rotating internships include straight services in physical therapy. This does not mean the training is wholly neglected, for varying amounts are included in connection with the treatment of individual cases on practically all services. According to the 1937 annual census of hospitals, it was determined that of 6,189 hospitals, 1,302 reported having physical therapy departments. It may be assumed that the majority of these are located in hospitals approved for internships and residencies of which there is now a total of 954. This would seem to indicate that interns and residents now have far more informal contact and experience with physical therapy than is generally considered. Not infrequently interns are assigned definite duties in physical therapy in connection with services in orthopedics, radiology or out-patient department.

The Council on Physical Therapy has prepared a section on physical therapeutics to be included in the new edition of the manual for interns now being published by the American Medical Association.

A beginning has been made in the establishment of residencies in physical therapy on the same basis as those in other specialties. The Council on Medical Education and Hospitals has recently approved two institutions for this purpose; others have indicated that residencies may be established. There are not yet a sufficient number of physicians qualified to teach and head hospital departments of physical therapy. In order to fill this gap and to supply an increasing demand, additional hospital residencies should be inaugurated.

Graduate Courses

As early as 1914 the American Medical Association concerned itself with the study of graduate medical education. Principles regarding graduate medical courses were adopted by the House of Delegates in 1923. Sources of graduate training in physical therapy were first given in *The Journal of the American Medical Association,* August 16, 1924. While this was a small list, it doubtless served well as a guide to many physicians seeking this type of training.

The Council on Medical Education and Hospitals is now engaged in a new comprehensive study of graduate medical education in the United States which, in view of rapidly changing conditions, may lead to formulation of new principles for graduate courses. The fact is well recognized that any course of instruction may increase knowledge and skill, but at the same time it is certain that better training will be furnished if the courses are properly graded and in compliance with some definite requirements.

It is of considerable interest and importance to note the recent establishment of fellowships in physical therapy at the Mayo Clinic. A recent article * outlined a tentative plan for graduate courses to prepare physicians to specialize in physical medicine which is well worth the attention of any who are contemplating the establishment of such a course as well as those physicians who are intending to prepare themselves as specialists.

At the present time eight medical schools offer adequate graduate courses for physicians who plan to specialize in this field. Short courses

* Krusen, F. H.: The Need for Graduate Training in Physical Medicine, J. A. Am. M. Coll. **11:** 361 (Nov.) 1936.

for general practitioners are also available in several of these. The schools are:

Columbia University College of Physicians and Surgeons.
Harvard University Medical School.
Northwestern University Medical School.
Temple University School of Medicine.
Tulane University School of Medicine.
University of Minnesota Medical School.
University of Pennsylvania School of Medicine.
University of Wisconsin Medical School.

In addition to what has been said of the activities of the Committee on Education of the Council on Physical Therapy, its efforts to acquaint the rank and file of the medical profession with the value of physical therapy have been greatly increased. Work with the state and county medical societies include arrangement of programs, presentation of papers, planning exhibits, lending films, and the like.

Education of Technicians

The survey of schools for physical therapy technicians was assigned to the Council on Medical Education and Hospitals in 1934. Following the initial inspection and study of thirty-five schools, the "Essentials" were formulated and adopted by the Council and passed by the House of Delegates of the American Medical Association on May 9, 1936. The first list of approved schools appeared in *The Journal of the American Medical Association*, August 29, 1936, and several lists have been published since. The number of schools conforming to the standards now totals fourteen and others are under consideration.

No standards for graduate courses for technicians have yet been promulgated. The Mayo Clinic is the most recent to offer organized graduate courses for technicians.

The "Essentials of an Acceptable School for Physical Therapy Technicians," aim to provide more adequate facilities for the training of technicians. The investigations of the various courses during the last few years have revealed in many cases a deplorable lack of requirements, organization, qualified faculty and particularly clinical material where students can develop skill in the application of this special knowledge. These conditions exist principally in so-called commercial schools. Approval is withheld by the Council for courses where arrangements are such that students are enrolled without the necessary preliminary background and proceed across a well paved short-cut to enter this highly technical field. Neither the American Medical Association nor any other self-respecting standardizing agency would endorse such a procedure, nor should they appear to do so by failing to do what they can to prevent it. Indirectly, this situation led to the interest taken by the American Medical Association in this type of education.

It is a curious fact that only a figurative handful of acceptable schools for physical therapy technicians exist in the United States. A great many more schools of the commercial character, which adhere to no particular standards, are operating and turning out each year large numbers of inadequately prepared technicians.

Recent attention has been drawn to the fact that there is an acute shortage of qualified technicians. The increased number of hospital departments of physical therapy and the extensive programs of the state crippled children's bureaus under the Social Security Act are experiencing great difficulty in securing the necessary qualified personnel for station and field work.

What is especially interesting is the steps advised for overcoming the difficulty arising from the fact that our present list of approved schools can supply only a small percentage of the technicians needed throughout the country; that is, lower entrance requirements, shorter courses, piecemeal courses, and limited training. Graduate training in orthopedic nursing may be considered as a means of supplying a part of the need.

The American Registry of Physical Therapy Technicians informs us that there is a steady flow of requests for technicians who are registered or who are eligible for registration but practically no candidates are available. Similar evidence of the shortage comes directly from certain state bureaus and medical personnel agencies. The results have been increased employment of graduates of unapproved schools and others with haphazard training, and indirectly a stimulus to enrollment in low-grade schools.

It is the desire of the Council on Medical Education and Hospitals to cooperate in every way with any hospital or educational institution in an effort to develop more well organized and well administered courses for technicians in the United States. This is clearly one of the greatest needs in physical therapy today.

Conclusion

The medical profession has succeeded in giving form and substance to education in physical therapy. It has been a long, hard fight and the job is not finished. The future is bright and as time goes on, I am sure we shall see even greater improvement in professional education and in the training of technicians.

The medical profession has always been able to outline its own policies and decide what is best for the patient. Physical therapy must be kept free from schemes to make it a layman's specialty in the practice of medicine. The surface plausibility has appealed to legislators and already there is licensure of technicians in several states, thus placing responsibility in a position where it cannot be assumed by virtue of training, and ultimately encouraging independent and unsupervised practice.

What the future of physical therapy will be is a matter of great concern. Certainly it is the American Medical Association and the American Congress of Physical Therapy, rather than political units, smaller groups or individuals, which will be the responsible and authoritative center for further progressive changes relating to the education of physicians and technicians.

Finally, I should like to emphasize the following points:

1. Premedical courses in physics and biology should be better adapted to physical medicine.
2. Medical schools should continue the splendid progress already made in the provision of instruction in physical therapy for undergraduates.
3. Whenever possible, hospitals should assign interns and residents service in physical therapy departments.
4. Additional residencies, fellowships and graduate opportunities might well be established.
5. More acceptable schools for physical therapy technicians are needed.
6. The search for a solution to the present shortage of qualified technicians should be guarded to obviate lowering of standards.
7. Licensure of technicians should be opposed as detrimental to the best interests of the patient.

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FEVER THERAPY TECHNIC IN SYPHILIS AND GONOCOCCIC INFECTIONS *

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The utilization of artificial fever has markedly enhanced the effectiveness of the treatment of gonococcic and syphilitic infections. Improvements in apparatus and a better understanding of the physiologic changes occurring during fever have made it possible to administer much more uniform treatments, thus rendering the patient more comfortable and minimizing reactions.

Many types of apparatus have been developed since the inception of artificial fever therapy. We believe that the apparatus to be used has little to do with the clinical results so long as the desired amount and height of fever are obtained. Two methods are now commonly employed for the induction of artificial fever. Both employ essentially the same principle for maintenance of the temperature level. In the hands of many workers, short wave apparatus of various types combined with an air conditioned cabinet have yielded satisfactory results. Other workers have successfully used conditioned air alone for both induction and maintenance of fever. In using short waves we have found that the dry bulb air temperature is somewhat lower during induction, but during maintenance it approaches the same level as if conditioned air alone were being used. Having found no particular advantages in short waves, we now employ a simplified type of air conditioned cabinet known as the Hypertherm.

It has been our experience that the air conditioned cabinet must be kept closed to maintain constant relative humidity and dry bulb temperature. The control of the conditioned air by proper instruments avoids excessive opening of doors and aids materially in lowering the dry bulb temperature. This has resulted in better control of the temperature level and has greatly enhanced the patient's comfort. At intervals it is necessary to determine the patient's blood pressure and to administer chemotherapeutic agents, but the opening of the doors should be minimized. Formerly, it was necessary to open the doors frequently to take the patient's rectal temperature with a mercury thermometer and to observe the skin for the erythematous areas which precede the development of first degree burns. The application of relative humidity approximating 100 per cent with dry bulb temperature at 110-115 F. during induction and 105-108 F. during maintenance has completely eliminated skin complications. Even erythema has disappeared. An electrical rectal thermometer, which gives the temperature level at all times, allows the nurse-technician to adjust the cabinet conditions at the slightest change in the patient's temperature. It can again be emphasized that wide excursions of dry bulb temperature and relative humidity during treatment adversely affect the patient's comfort as well as the physiologic balance of body fluids and electrolytes.

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* From the Kettering Institute for Medical Research, Miami Valley Hospital, Dayton, Ohio.
* Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 7, 1939.

In addition to the elimination of skin complications, other reactions have disappeared or become minimized. Delirium produced by cerebral edema is now a rare complication. When it does occur it is seen particularly in patients with neurosyphilis where some degree of vascular disturbance already exists. Efficient intestinal absorption of saline solution given by mouth decreases the tendency toward edema formation by maintaining a better balance between the body fluids and extracellular and intracellular electrolytes. As evidence of the more nearly physiologic water balance with present day technic, urination during treatment now takes place with a frequency approaching normal. Administration of fluids by the intravenous route has been eliminated with the exception of concentrated dextrose solution. The hypertonic dextrose solution is given not only for the purpose of maintaining a higher osmotic pressure of the plasma but also to replenish the available dextrose which is being utilized during treatment. The better absorption of fluids in the gastro-intestinal tract has materially decreased nausea and vomiting. Severe degrees of vomiting have been practically eliminated. Milder degrees of emesis, due to chemotherapeutic agents or psychogenic factors, persist in some patients although not to the extent formerly noted.

All of these factors combine to minimize the abnormal physiologic changes which occur during artificial fever with the result that there is increased comfort to the patient, easier administration of treatment, and fewer post-fever reactions. They have enabled us to advocate hyperpyrexia as an ambulatory form of treatment for most patients.

Syphilis

Sufficient investigative and clinical work with artificial fever have been carried out during the past ten years to warrant its occupying an important place as an adjunct to chemotherapy in the management of syphilis, particularly neurosyphilis and the exudative forms of ocular syphilis. At the beginning of our work, artificial fever therapy was applied almost wholly to hospitalized patients. With the development of better apparatus and technic, the majority are now being treated on an ambulatory basis. It would be economically impossible for many to undertake treatment if they were to be confined to a hospital for an indefinite period of time. Artificial fever combined with chemotherapy as an ambulatory form may be classified between chemotherapy which is entirely ambulatory and malaria which is entirely institutional.

Since November, 1931, we have treated 876 patients with artificial fever. These patients have received a total of 5,006 treatments (34,264 hours of fever). Of this group, 344 patients were treated for syphilis. According to the manifestations of the disease they were classified as follows: Primary, 37; secondary, 41; latent, 43; skin and mucous membrane, 3; bone and joint, 7; tabes dorsalis, 40; general paresis, 79; tabo-paresis, 21; asymptomatic neurosyphilis, 23; meningo-vascular, 13; ocular, 44; and nerve deafness, 2. The majority of these patients were treated on an ambulatory basis. Hospitalization was required for those with neurosyphilis who received psychiatric treatment between sessions and for those requiring treatment for pathologic conditions other than syphilis.

Until the past two years, five-hour sessions of fever therapy at 105-106 F. (rectal) at weekly intervals, combined with chemotherapy, for a total of 50 hours, was the usual course. Satisfactory clinical results were obtained during this time.[1,2] Since then we have reduced the total amount of treatment as well as the number of hours per treatment. Three-hour sessions were started in February, 1937, and since that time this method has been

adopted as a routine procedure. It has thus been made possible for the nurse-technician to give two treatments per day, which not only reduces the administrative expense but also furthers an ambulatory program. The three-hour sessions have been given at weekly or semi-weekly intervals to ambulatory patients and three times weekly to those confined to the hospital. Similar clinical results have been obtained in all. In this group, regardless of the intervals between treatments, the total number of hours for the course of treatment has averaged 36 hours of fever at 105-106 F. For out-of-town patients who cannot commute at weekly intervals, hospitalization is advocated, the course of combined fever-chemotherapy covering approximately four weeks. The course for patients who continue with their occupation, receiving treatment at weekly intervals, averages twelve weeks. All syphilitic patients receive a follow-up course of at least twenty injections of each of the bismuth and arsenical drugs, given concurrently at weekly intervals after the conclusion of the course of combined fever and chemotherapy.

Individualization of the therapeutic program according to the status of the patient under treatment is of paramount importance. Most patients being treated for symptomatic syphilis can tolerate three hours of fever at 105-106 F. with no difficulty. Markedly debilitated patients, those in the upper age brackets and those with manifestations of mental deterioration, constitute a group which ordinarily would be considered poor risks for such a procedure. It has been our practice to administer to these groups artificial fever in shorter sessions at lower temperatures in the beginning, increasing the height and length of fever as the course of treatment progresses. In this manner we have been able with minimal risk to afford a large group of patients a course of fever combined with chemotherapy. By such individualization it has been possible to extend treatment to advanced tabetic and deteriorated paretic patients in whom ordinarily little is to be expected in the way of clinical improvement. For the first treatment they are subjected to one hour of fever at 102-103 F. If this is well tolerated, the next treatment, whether weekly or semi-weekly, is given for one hour at 103-104 F. After this the fever is increased to 104-105 and finally to 105-106 F. When the desired height is reached, the length of fever is gradually increased until we are able to give three hours of fever at 105-106 F. If at any time the patient should display evidence of intolerance to the treatment, either the same length and height of fever or a shorter session at a lower temperature is given at the next treatment. The average patient is able to bear the full three-hour session at 105-106 F. (rectal) after two or three of the short sessions at this level. This individualization has been rendered more feasible by the improvements in apparatus and technic.

Since the inception of our work, the treatment of choice has been fever therapy combined with chemical therapy. Early in the course of our work, bismarsen, 0.2 Gm., was given intramuscularly immediately before each fever session. This drug was continued for twenty weeks after completion of the combined course of fever and chemotherapy. During experimental studies in the treatment of early syphilis neoarsphenamine was given intravenously when the patient's temperature first reached the desired level (105 F.). The bismuth preparation was given intramuscularly immediately before the fever session was started. When it was observed that no reactions followed the administration of the intravenous drug during fever to the group of patients with early syphilis, a similar procedure was adopted in the treatment of the other forms of this disease. During the past five years we have not encountered any serious reactions to the arsenicals (neoarsphenamine or mapharsen) when administered in this manner. On the contrary, we feel that the toxic

manifestations have been eliminated or greatly minimized by this procedure. We have treated in exactly the same way a group of patients who were referred to us because of sensitization to chemotherapy. In this group, when the chemotherapeutic agent was administered during fever, no reactions were noted, although when the same drug was given after completion of the combined course, sensitization reactions were again noted. Those patients who received two or even three treatments weekly have experienced no untoward chemical reactions, even though rather large quantities were administered over a period of one week. Therefore it is our impression that by fortifying these drugs with fever, large doses can be given with safety. It is thus possible that the course of treatment may not only be shortened but more uniform therapeutic results obtained.

In symptomatic syphilis the clinical response is the chief guide during treatment. In asypmtomatic syphilis, or in syphilis which becomes asymptomatic during the course of treatment, examinations of the blood and spinal fluid may show persistently positive reactions by the standard diagnostic tests.[3] The determination of the quantitative (Kahn) titer of both blood and spinal fluid has proved to be such an extremely valuable therapeutic guide that we cannot too strongly urge its general adoption.

Gonococcic Infections

In contrast to artificial fever in the ambulatory treatment of syphilitic infections, we have found that a short period of hospitalization is essential for refractory gonococcic infections.

Since the advent of sulfanilamide, the treatment of gonococcic infections has been greatly altered. The rapidity with which some cases yielded to the intelligent administration of this drug has obviated the necessity for accessory therapeutic agents. Unfortunately, this drug and its allied compounds have not been effective in all patients suffering from this disease. In a survey made by Dees and Young,[4] they report that of 2,727 cases collected from the literature, 68 per cent were cured by sulfanilamide, either alone or in combination with mild local treatment. Therefore, at least 30 per cent of patients with gonococcic infections may be considered to be candidates for artificial fever therapy. During the past two years we have accepted for this therapy only those patients who have not responded to adequate treatment with sulfanilamide or related compounds.

At the beginning of our work, treatments for gonococcic infections were given at weekly intervals, in sessions of five hours, similar to those for syphilitic infections. As the interval between sessions was decreased to twice weekly or more often the total number of required treatments was appreciably lessened. The length of treatment was then gradually increased and it was learned that the longer the sessions and the shorter the intervals between treatments, the more prompt was the response. The important researches of Carpenter, Boak, Mucci, and Warren[5] upon the thermolability of different strains of gonococci laid the foundation for accurate dosage of fever in treating this infection. The determination of the thermal death time of the strain of gonococcus recovered from each patient and his treatment in accordance with such finding presented many difficulties. Nevertheless, these researches provide the impetus toward the administration of fever in longer sessions, even if the dosage did not approximate the thermal death time during one session. With the improvements in apparatus and a better understanding of the physiologic changes during fever, ten-hour sessions at 106.6 F. were found to be practical. In a group of 18 patients subjected to this procedure an average of 1.5 treatments were necessary to effect cures. It

should again be emphasized that this group comprised cases known to be resistant to sulfanilamide and local treatment.

The known value of sulfanilamide in gonococcic infections prompted us to investigate this drug in combination with artificial fever. This product was administered to three series of patients for 3 days, 2 days, and 1 day, respectively, prior to the ten-hour session of fever at 106.6 F. It was found there was no essential difference between the amount of the drug given and the time over which it was administered, provided that blood sulfanilamide concentration at the time of the beginning of the fever session was 10-14 mg. per cent. Having observed that the patients who had received the drug at intervals of four hours the day and night preceding the fever treatment had had little rest and exhibited toxic symptoms, it was decided to give a single large dose of sulfanilamide intravenously approximately one hour before the fever session.

The present plan of treatment is as follows: The patient is admitted to the hospital where eligibility for fever therapy is determined. This is ascertained by the diagnostic survey similar to that carried out in all patients except that a thorough bacteriologic study is made of the secretions of the genital tract and of any complicating foci. While in the hospital, the patient receives a diet high in carbohydrates and sodium chloride. On the evening preceding the treatment a cleansing enema is given. On the morning of the treatment, all food is withheld, but there is no restriction of fluid intake. A short preliminary "pilot" treatment is given for the purpose of conditioning the vascular system to the demands of fever, to allay apprehension, and accustom the patient to the warm, humid atmosphere. The "pilot" treatment is given at a rectal temperature of 105 F. for one to three hours. The following day the patient rests. The next morning he receives an intravenous injection of sulfanilamide as a 1 per cent solution in physiologic saline one hour before the fever treatment. The amount received is calculated on the basis of three-fourths of one grain per pound of body weight. After twenty to thirty minutes to allow distribution of the sulfanilamide through the body fluids the ten-hour session is begun. After an induction period averaging one hour, the rectal temperature is maintained at 106.6 F. for ten hours. During this time the temperature is not permitted to vary more than 0.1 to 0.2 F. at any time.

Shortly after the session is begun, a B-L-B nasal oxygen mask is applied and pure oxygen is given continuously at the rate of 6 to 8 liters per minute. This type of mask has proved very comfortable to the patients and does not interfere with the administration of fluids by mouth. The patient quickly becomes accustomed to the continuous use of the mask. At intervals of three hours, he receives 50 cc. of 50 per cent dextrose solution intravenously. Otherwise, no fluids are given by this route. He is encouraged to drink at least 300-400 cc. of 0.6 per cent saline solution per hour. This amount is well tolerated and many patients consume somewhat larger quantities. Urination during the treatment occurs at regular intervals, varying with the amount of perspiration. The pulse rate seldom exceeds 130 per minute during the induction period and averages 120 during maintenance. Blood pressure is maintained at a slightly elevated systolic, but a constant diastolic, level during the entire session. Small doses of pantopon (grain 1/6) are given for sedation, averaging 2 to 3 doses during the entire session. The majority of patients sleep, except when they are aroused to take fluids or intravenous medication is administered. At the conclusion the patient is removed from the cabinet and defervescence is allowed to take place spontaneously. He is then transferred to his hospital bed.

The post-fever course has been uneventful in this group. By noon the following day the patient is allowed to eat normally and by evening is able to be up and around his room. On the second day, the secretions of the genital tract are examined by smear and culture. These examinations are repeated for three consecutive days. If all examinations are negative, the patient is dismissed from the hospital. Male patients are re-examined at weekly intervals for three weeks. Female patients are re-examined on the first post-menstrual day after three consecutive periods. After the six examinations, if there is no evidence of gonococci by smear and culture, the patient is dismissed as cured.

It has been of particular interest in this group to note that the severity or duration of the disease does not parallel the amount of treatment required to effect a bacteriologic and clinical cure. However, the longer the disease has been present, with consequent destructive changes, particularly in gonococcic arthritis, the slower is the restoration to a normal status.

The McLeod medium for the cultivation of the gonococcus as modified by Thompson[6] and the plasma developed in our department[7] have been used as culture media. The colonies are identified by the oxydase reaction and confirmed by Gram's stain and sugar fermentation.

It is interesting to note that the first examination of secretions following treatment will often show a purulent character similar to that observed before treatment. The cultures of such material, however, are negative for gonococci. This further shows the importance of the culture technic as a criterion of cure.

The group treated with fever combined with intravenous sulfanilamide comprised 19 cases. With one exception, all have been bacteriologically and clinically negative following one ten-hour session at 106.6 F. Hospitalization averaged nine days. This includes two days for the diagnostic survey, two days for fever treatment, two days for rest, and three days for bacteriologic studies after treatment.

These preliminary observations lead us to conclude that of all infections treated by fever therapy in combination with some chemotherapeutic agent, the most specific response is obtained in gonococcic infections with artificial fever combined with sulfanilamide. With the improvements in apparatus and the evolution of new technical procedures, this type of treatment can be carried out with safety and comfort to the patient. Prolonged experience has only served to strengthen our early conviction that artificial fever therapy should be administered only by thoroughly trained workers in well-equipped hospitals.

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Note: Discussions on this paper will appear in a later issue as part of the Symposium on Fever Therapy. —Ed.

COMBINED ARTIFICIAL FEVER AND CHEMOTHERAPY IN DEMENTIA PARALYTICA *

Preliminary Report of 70 Cases

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The relative value of the various forms of therapy in dementia paralytica is still in dispute. There is no argument, however, over the fact that until the introduction of malarial therapy by von Jauregg the management of general paresis was unsatisfactory. Since that time malarial therapy has generally been the accepted procedure of this severe type of active neurosyphilis. Within the last ten years the question of superiority or preferential place for this treatment has been seriously challenged by other methods of fever induction, on the ground that they are more scientific, less empiric, less hazardous and productive of a higher percentage of clinical remissions from all symptoms. The clinical and experimental evidence to substantiate this opinion has been reviewed elsewhere[1, 2] by one of us (A. E. B.) and by many other workers in the field.

The purpose of this paper is to review a five year experience in the treatment of dementia paralytica by combined artificial fever therapy and chemotherapy at the University of Nebraska College of Medicine. We shall also compare previous experiences at Hastings State Hospital in treating general paresis by chemotherapy alone, malarial inoculation followed by chemotherapy, and our present method of artificial fever combined with chemotherapy. No other type of neurosyphilis is considered in this report. Favorable results obtained in asymptomatic, meningovascular and tabetic types have been reported elsewhere.[3, 4]

Adequate records suitable for this study were obtained dating from 1926. From then up to 1931 chemotherapy in the form of tryparsamide and heavy metals, (bismuth and mercury) were used. During this five year period 57 cases of dementia paralytica were given an adequate course of chemotherapy. Only 7, or 12 per cent, obtained a clinical remission or sufficient improvement to be discharged from the state hospital. In one of these patients an attack of erysipelas with high fever seemed to have brought about the improvement in the mental state.

Active malarial therapy was begun in 1931. In the succeeding five years 65 patients with general paresis were each given 12 malarial chills. After the malarial therapy all were further treated with tryparsamide and bismuth. This was continued several years and was followed by reversal of the serologic reaction in most instances. During this five year period 27, or 42 per cent, obtained a remission sufficient to warrant parole or discharge.

In 1937, the method of treatment used in the University of Nebraska Fever Therapy Department since 1934 was introduced. This consists of administering

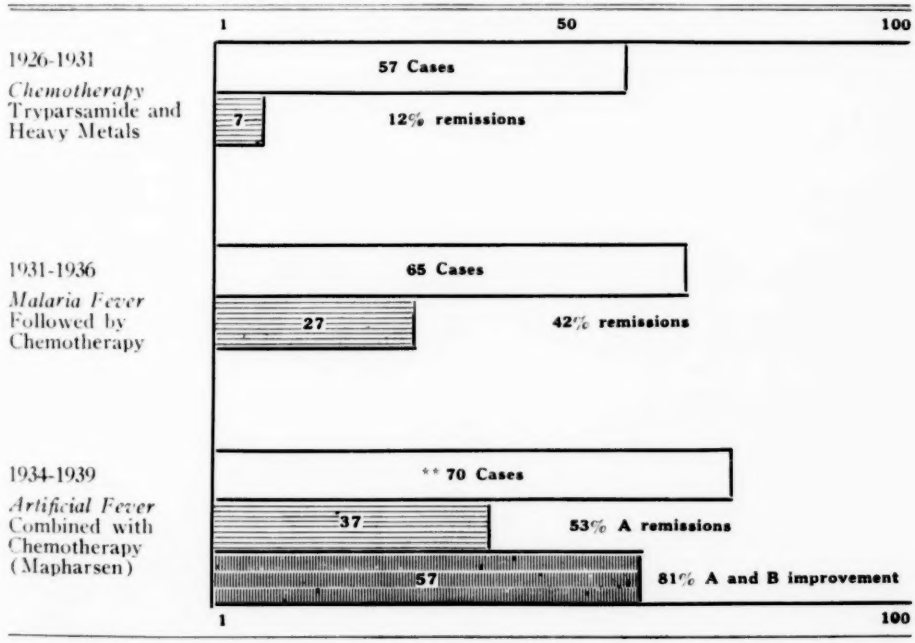
* From the University of Nebraska Fever Therapy Research and Clarkson Memorial Hospital Psychiatric Departments and Hastings State Hospital.

* Read at the Eighteenth Annual Session of the American Congress of Physical Therapy, New York City, September 7, 1939.

50 hours of artificial fever above 105 F., induced by means of the Kettering Hypertherm, combined with 0.06 Gm. of mapharsen (meta-amino-parahydroxy-phenylarsine oxide*), given in 10 to 15 sessions of three to five hours. Lately we have administered also a bismuth salt 0.01 Gm. with each fever session. By this method we have completed treatments in 70 patients of general paresis — 30 from the University of Nebraska, College of Medicine Clinic, and 40 from Hastings State Hospital — all of whom have been under observation at least six months, thus obtaining sufficient clinical and serologic data upon which properly to evaluate therapeutic results. A full clinical remission of mental symptoms was obtained in 37, or 53 per cent of this entire group, while some degree of improvement was obtained in 20 additional patients or a total of 81 per cent. Four of the latter group were improved sufficiently to be paroled, but are classed as "B" result because of not reaching their former economic or social adjustment level. If the criterion of parole or discharge were used the percentage would be 58.5. These results include a number of very chronic patients who had remained in state hospitals two or more years and were not improved by vigorous chemotherapy. A special group of malarial failures, 12 patients committed from one to five years are included in this series. After remission by fever, further chemotherapy is given until serologic reversal is obtained.

Table 1 shows the comparative percentage of treatment results obtained by the various therapeutic methods employed.

TABLE 1 — *Comparative Incidence of Remissions From Various Forms of Therapy in Paretic Dementia at Hastings State Hospital*



The 70 patients adequately treated and observed at least six months include 10 patients classified as taboparesis, and 12 patients who failed to obtain a clinical remission from malarial therapy followed by tryparsamide. Of the re-

* We are indebted to Parke, Davis & Company for cooperation in this study.
Criterion of remission for tryparsamide and malarial groups was improvement sufficient for parole or discharge. For combined fever and chemotherapy, absence of all mental symptoms, return to former economic and social status.

** 70 Cases include 30 from Fever Therapy Research Department having 56% A remissions; 40 committed state hospital paretics including 12 chronic malarial failures, 47.5 A remissions.

maining 48 patients, 20 treated in the research clinic were early types of general paresis, only one-half of which required psychiatric hospitalization. The remaining 28 were all committed state hospital paretics of severe grade. Many were markedly deteriorated, having been paretic as long as five years.

The following tables show the clinical results and serologic reversals for this entire group. Only 17 out of 70 patients reported they had not received previous chemotherapy. Results are graded "A," "B" and "C." "A" means full remission, return to former economic and social status showing normal sensorium tests, no psychotic trends and full insight. "B" refers to improvement in some degree, a partial remission in mental status, at times equivalent to social recovery. "C" means unimproved or worse than before treatment.

TABLE 2. — *Clinical Results and Serologic Reversals in 20 Patients With Early Paresis.**

Case	Previous Chemotherapy	Blood	Spinal Fluid	Months of Observation		Clinical Results
1	None	Unchanged	Less Positive	44	A	
2	Much	Reversal to Negative	Less Positive	28	B	
3	Little	Reversal to Negative	Reversal to Negative	51	A	
4	Much	Unchanged	Unchanged	40	B	
5	None	Unchanged	Unchanged	39	A	
6	Much	Reversal to Negative	Reversal to Negative	29	A	Died 2 yrs. later — cerebral thrombosis
7	None	Less Positive	Reversal to Negative	40	A	Complicated by aoritis
8	None	Unchanged	Reversal to Negative	24	A	
9	Little	Unchanged	Reversal to Negative	51	A	
10	Much	Remained Negative	Reversal to Negative	24	A	
11	Little	Unchanged	Less Positive	38	A	
12	Some	Reversal to Negative	Less Positive	19	A	
13	Little	Unchanged	Less Positive	18	A	Marked improvement in aortitis, hemiataxia and hemiparesis
14	None	Unchanged	Unchanged	15	A	
15	None	Less Positive	Reversal to Negative	16	B	
16	Much	Reversal to Negative	Unchanged	11	B	Residual petit mal
17	Some	Less Positive	Less Positive	10	B	
18	Some	Less Positive	Reversal to Negative	11	A	
19	Some	Unchanged	Remained Negative	10	B	Working; no more dizzy spells
20	Some	Unchanged	Unchanged	10	C	Committed to State Hospital; died six months later

Clinical Results: A — 13 patients, or 65 per cent
B — 6 patients, or 30 per cent
C — 1 patient, or 5 per cent

Spinal Fluid Serology: Complete reversal — 8 patients, or 40 per cent
Partial reversal — 6 patients, or 30 per cent
Unchanged — 5 patients, or 25 per cent
Remained negative — 1 patient, or 5 per cent

Comments on Table 2: These patients were in the earlier stages of paresis but incapacitated. About one-half required psychiatric hospitalization. Two patients had severe

* From the Fever Therapy Medical Department of the University of Nebraska Medical School.

cardiovascular complications, none died under treatment, but 2 died subsequently — one 6 months later after obtaining temporary improvement, another 2 years later after obtaining a full remission returning to his former occupation until death. Patient No. 19 had a negative spinal fluid reversed by previous chemotherapy but was treated for continued sensorium changes and petit mal attacks.

TABLE 3. — *Clinical Results and Serologic Reversals in 10 Patients With Early Taboparesis.**

Case	Previous Chemotherapy	Blood	Spinal Fluid	Months of Observation		Clinical Results
1	Little	Unchanged	Unchanged	41	C	
2	Much	Reversal to Negative	Reversal to Negative	31	B	
3	None	Unchanged	Reversal to Negative	45	A	
4	None	Unchanged	Unchanged	21	A	
5	Much Swift-Ellis	Less Positive	Less Positive	30	A	
6	Some	Remained Negative	Remained Negative	17	B	Moderate improvement
7	Much	Unchanged	Reversal to Negative	14	C	Committed to State Hospital
8	None	Unchanged	Reversal to Negative	18	A	
9	None	Unchanged	Unchanged	12	A	
10	Some	Remained Negative	Remained Negative	14	B	

Clinical Results: A — 5 patients, or 50 per cent
B — 3 patients, or 30 per cent
C — 2 patients, or 20 per cent

Spinal Fluid Serology: Complete reversal — 4 patients, or 40 per cent
Partial reversal — 1 patient, or 10 per cent
Unchanged — 3 patients, or 30 per cent
Remained negative — 2 patients, or 20 per cent

Comment on Table 3: These patients all had marked tabetic symptoms in addition to paretic dementia. Two cases had negative spinal fluids reversed by previous chemotherapy, treated because of continued mental symptoms. Neither case obtained a good result.

TABLE 4. — *Clinical Results and Serologic Reversals in 28 Patients With Early Paresis.***

Case	Previous Chemotherapy	Blood	Spinal Fluid	Months of Observation		Clinical Results
1	None	Unchanged	Less Positive	13	B	Paroled to wife — unemployed
2	Much Typhoid	Less Positive	Reversal to Negative	14	A	Paroled; complete remission
3	Some	Less Positive	Less Positive	14	A	Paroled — employed
4	Some	Unchanged	Less Positive	15	A	Complete remission; paroled; employed
5	Some	Less Positive	Less Positive	13	A	Complete remission; paroled; employed
6	Much	Less Positive	Less Positive	14	A	Complete remission
7	None	Unchanged	Reversal to Negative	12	C	Unchanged
8	Much	Unchanged	Reversal to Negative	10	A	Paroled; occupational recovery
9 (Juvenile paresis)	None	Unchanged	Reversal to Negative	15	A	Attending school
10	8 yrs. committed 2 yrs.	Less Positive	Less Positive	10	B	Better institutional patient after 2 yrs. commitment
11	Much	Unchanged	Unchanged	10	C	Unchanged, committed 4 yrs.

* From the Fever Therapy Medical Department of the University of Nebraska Medical School.
** From the Fever Therapy Department of the Hastings State Hospital.

(Continued on next page)

TABLE 4. — *(Concluded)*

12	Much	Reversal to Negative	Reversal to Negative	8	C	Unchanged
13	Some	Unchanged	Less Positive	11	A	Paroled — occupational recovery after 2 yrs. committment
14	Some	Unchanged	Unchanged	6	B	Paroled — unemployed
15	Some	Unchanged	Less Positive	6	A	Paroled — employed
16	Some	Unchanged	Unchanged	6	B	Improved institutional patient
17	Some	Unchanged	Less Positive	6	C	Unchanged
18	None	Unchanged	Reversal to Negative	6	A	
19	Some	Unchanged	Less Positive	8	C	Unchanged after 100 hrs. of fever therapy
20	Some	Unchanged	Reversal to Negative	6	A	Paroled — employed
21	None	Unchanged	Remained Negative	8	A	Paroled
22	Some	Reversal to Negative	Reversal to Negative	6	A	Paroled — employed
23	Some	Reversal to Negative	Unchanged	6	B	Paroled
24	Much	Reversal to Negative	Unchanged	6	A	Paroled
25	Some	Reversal to Negative	Less Positive	6	B	
26	Some	Less Positive	Less Positive	6	B	Paroled — unemployed
27	None	Less Positive	Less Positive	6	B	
28	Some	Less Positive	Less Positive	6	A	Paroled

Clinical Results: A — 15 patients, or 54 per cent
B — 8 patients, or 28.5 per cent
C — 5 patients, or 18 per cent

Spinal Fluid Serology: Complete reversal — 8 patients, or 28 per cent
Partial reversal — 14 patients, or 50 per cent
Unchanged — 4 patients, or 14.5 per cent
Remained negative — 2 patients, or 7.5 per cent

Comment on Table 4: These 28 cases represent the advanced cases of paretic dementia — all committed state hospital patients — many were residents for several years. Over one-half have been followed less than one year accounting for less reversal in serology than the cases in table 3. One patient (case No. 9), obtaining a full remission, was a case of juvenile paresis. There were no deaths under treatment in this series.

TABLE 5. — *Clinical Results and Serologic Reversals in 12 Patients Who Failed to Obtain a Clinical Remission From Malarial Therapy Followed by Tryparsamide.**

Case	Previous Chemotherapy	Blood	Spinal Fluid	Months of Observation	Clinical Results	
1	Much malaria	Remained Positive	Remained Positive	23	A	
2	Tryp. malaria	Reversal to Negative	Reversal to Negative	37	C	
3	Much malaria	Unchanged	Unchanged	17	B	
4	Much malaria	Remained Positive	Reversal to Negative	32	A	
5	Much malaria	Reversal to Negative	Reversal to Negative	17	B	Better hospital patient
6	Some malaria	Unchanged	Less Positive	13	A	Complete remission — paroled
7	Much malaria	Unchanged	Less Positive	17	C	Worse
8	Much malaria	Less Positive	Less Positive	17	A	Complete remission — paroled — employed
9	Little malaria	Unchanged	Less Positive	15	C	No change

* From the Fever Therapy Department of the Hastings State Hospital.

TABLE 5. — (*Concluded*)

10	Much malaria	Unchanged	Reversal to Negative	17	C	No change
11	Some malaria	Unchanged	Less Positive	7	C	No change
12	Much malaria	Unchanged	Unchanged	6	B	Marked improvement

Clinical Results: A — 4 patients, or 33⅓ per cent
B — 3 patients, or 25 per cent
C — 5 patients, or 41.6 per cent

Spinal Fluid Serology: Complete reversal — 4 patients, or 36 per cent
Partial reversal — 5 patients, or 45 per cent
Unchanged — 2 patients, or 16.6 per cent
Remaining negative — 1 patient, or 8.3 per cent

Comment on Table 5: Many of these cases had been committed 2 to 5 years after malarial therapy and had received adequate courses of tryparsamide and bismuth. They were given 50 hours of artificial fever above 105 degrees, combined with mapharsen. Three of the 4 patients obtaining remissions were not complete malarial failures but had obtained some degree of improvement from malaria 3 to 4 years previously. Further improvement was not obtained by chemotherapy and one patient had regressed. One patient not benefited by malaria obtained a good temporary improvement, then relapsed. Two others, improved, had run poor courses with malaria — spontaneous termination after 5 chills. The 5 patients showing no improvement with combined artificial fever and chemotherapy had all received 10-16 malarial chills with high temperature without the slightest degree of improvement, and subsequent prolonged tryparsamide and bismuth likewise failed to improve them. No deaths occurred in this series, but one death occurred in a deteriorated malarial failure after the first fever session from cerebral hemorrhage.

Comment on Results Obtained in the Entire 70 Cases of dementia paralytica treated by 50 hours of fever above 105 degrees combined with mapharsen: Thirty-seven patients, or 53 per cent, obtained a full remission; 20 more, or 28.8 per cent showed improvement; while 13, or 18.5 per cent were unimproved.

The spinal fluid serology was completely reversed to negative in 24 patients, or 34 per cent, and partially reversed in 26, or 37 per cent.

At the university of Colorado, Psychopathic Hospital, a comparative study of the value of malarial therapy and artificial fever combined with chemotherapy has been underway for the past four years.[5] Through the courtesy of Doctors Franklin G. Ebaugh, C. H. Barnacle and J. R. Ewalt, we are permitted to report the present status of this project.

TABLE 6. — *Colorado Psychopathic Hospital Clinical Results*

	Artificial Fever Combined with Tryparsamide			Therapeutic Malaria Followed by Tryparsamide		
	Cases	Percentage		Cases	Percentage	
Marked improvement	29	33.3	78.1	13	18.0	66.5
Improved	39	44.8		35	48.5	
Unimproved	11	12.6		13	18.0	
Died —						
during treatment	2	2.3		2	2.6	
later	4	4.5		7	9.7	
Deaths due to other causes	2	2.3		2	2.6	
Total	87	99.8		72	99.4	
	Followed 6 mo.—4½ yrs. average 2.9 yrs.			Followed 6 mo.—4½ yrs. average 2.8 yrs.		

(Continued on next page)

SPINAL FLUID SEROLOGY: (Table 6.)

	Artificial Fever			Therapeutic Malaria		
Complete reversal	31 patients, or 35.6	} 63.1	per cent	22 patients, or 30.5	} 49.1	per cent
Partial reversal	24 patients, or 27.5			14 patients, or 19.4		
Unchanged	24 patients, or 27.5		per cent	25 patients, or 34.7		per cent
Deaths	8 patients, or 9.1		per cent	11 patients, or 15.2		percent
Total	87	99.7	per cent	72	99.8	per cent

From these experiences we feel justified in drawing the following deductions of the comparative value of malarial inoculation followed by tryparsamide and combined artificial fever and chemotherapy in general paresis.

Patients of advanced years, or in poor condition complicated by hypertension or aortitis can be treated with greater safety in the hypertherm because the height and duration of temperature can be adequately controlled.

The combination of chemotherapy and artificial fever increases therapeutic effectiveness.

The prescribed number of treatment hours is more easily obtained with physically induced fever. The results obtained are definitely correlated with the amount of fever given.

Patients who show mild symptoms do not require hospitalization. Hospitalization is markedly shortened by artificial fever therapy as compared with malaria. Physically induced fever is harder to administer to noncooperative patients requiring individual attention and expert nursing.

Certain workers believe that the relapse rate is higher with physically induced fever. This has not been our experience. We believe relapses occur when an insufficient amount of fever (less than 50 hours at 105 degrees) has been given. The mortality is much less from artificial fever therapy than from malaria.

A fair percentage of patients who fail to improve from malaria, especially those who do not receive adequate number of chills, can be improved by artificial fever combined with chemotherapy.

Summary

A comparative study of treatment of state hospital cases of paretic dementia revealed a 12 per cent incidence of clinical remission from chemotherapy (tryparsamide) alone, a 42 per cent incidence of clinical remission from malarial fever followed by chemotherapy, as compared to a 53 per cent clinical remission obtained by combined artificial fever and chemotherapy.

In 20 cases of early paretic dementia a full remission was obtained in 65 per cent, and partial improvement in 30 per cent. Complete reversal in spinal fluid serology was obtained in 40 per cent with partial reversal in 30 per cent after combined artificial fever and chemotherapy. In 10 cases of taboparesis, 50 per cent obtained a full remission and 30 per cent, a partial remission. Spinal fluid serology was reversed completely in 40 per cent, and partially reversed in 10 per cent.

In 28 cases of advanced paretic dementia committed to a state hospital, 54 per cent obtained a full clinical remission and 28 per cent a partial remission. Complete reversal in spinal fluid serology occurred in 28 per cent, partial reversal in 50 per cent.

In 12 cases failing to obtain a full remission from a course of malarial inoculation followed by tryparsamide, 33⅓ per cent obtained a full remission and an additional 25 per cent improved. Spinal fluid was reversed to negative in 33 per cent and improved in 41 per cent.

The results from artificial fever, 50 hours above 105 degrees combined with mapharsen in the entire 70 cases of all stages of paretic dementia, were 53 per cent full remission with an additional 28 per cent improved. Complete re-

versal of spinal fluid serology occurred in 34 per cent with partial reversal in an additional 37 per cent.

Conclusions

The percentage of clinical remissions in paretic dementia is about 20 per cent greater after a full course of combined artificial fever and chemotherapy than from malarial inoculation. This includes certain grave risks that are unable to withstand malarial therapy. The percentage of serologic reversal is likewise higher after artificial fever combined with chemotherapy. The mortality is much less from artificial fever than from malarial therapy, if given by expert attendants.

A fair percentage of malarial failures can obtain a clinical remission by additional treatment in the form of combined fever and chemotherapy.

The percentage of full clinical remissions in early paresis obtained by combined artificial fever and chemotherapy is better than 60 per cent. In advanced state hospital paretics a full remission can be obtained in about 50 per cent.

We do not believe there is a higher incidence of relapse from physically induced fever unless an insufficient amount of fever is given.

At present, combined artificial fever and chemotherapy is the most effective method of treatment known for resistant asymptomatic neurosyphilis. Treatment in this stage prevents active clinical neurosyphilis. It is also the most effective treatment for all types of active clinical neurosyphilis including paretic dementia.

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Note: Discussions on this paper will appear in a later issue as part of the Symposium on Fever Therapy. — Ed.

SCIENCE, NEWS, COMMENTS

New York Physical Therapy Society Meeting

A closed meeting of the New York Physical Therapy Society will be held at 8:30 P. M., on Wednesday of October 4, at the Liederkranz Club, 111 East 58th Street. The scientific program will consist of two papers:

1. Stethographic Registration and Gramophone Recording of Normal and Pathologic Heart Sounds: Their Value as a Means of Analysis (with Demonstration), *Franz M. Groedel*, M.D.

2. Cryotherapy, a New Physical Measure in Therapy. Report of Dr. Temple Fay's Work at Temple University, *Madge C. L. McGuinness*, M.D.

Following the scientific session there will take place an important executive meeting for the purpose of discussing plans for the future benefit of the society. This meeting is announced for members only and a collation is guaranteed.

FAREL JOUARD, M.D.,
President.

MADGE C. L. MCGUINNESS, M.D.,
Secretary.

Postponement of Next International Session of Medical Hydrology

Due to the outbreak of the war in Europe, it has been necessary for the International Society of Medical Hydrology to request the Italian Committee to postpone indefinitely the Annual Meeting, which was scheduled to be held in Italy during October. This move is in keeping with the action of other International Societies which have been forced to cancel their meetings for the present.

Inasmuch as the membership of the International Society is largely distributed through the countries now at war, it has been necessary to reduce the activities of the International Society of Medical Hydrology to the minimum. In keeping with that policy, the *Archives of Medical Hydrology* for October are not being issued at the present time. Correspondence addressed to the Society at its regular address will receive attention, 22 Bedford Place, London, W. C. 1.

Dr. Max Thorek Honored

On the occasion of the Fiftieth Anniversary of the founding of the University of Sofia, Bulgaria, Dr. Max Thorek of Chicago, Attending Surgeon of Cook County Hospital and Surgeon-in-Chief of the American Hospital of Chicago, has been made a Commander of the Order of St. Alexander of Sofia for his contributions to surgery.

Pacific Physical Therapy Association

The regular monthly meeting of the Pacific Physical Therapy Association will be held October 25, in the Presbyterian Hospital, Hollywood, and the following program will be presented:

1. Report of the 18th Annual Convention of the American Congress of Physical Therapy, *Fred B. Moor*, M.D.

2. Demonstration of Common Orthopedic Procedures:
   (a) After Care of Fractures.
   (b) Treatment of Muscle Hardening, *G. Mosser Taylor*, M.D.

3. Discussion of the Reorganization of the Association.

General discussion will follow each of the above papers.

This meeting is of great importance to all members, both Physicians and Technicians.

Fred B. Moor, M.D., President. Clarence W. Dail, M.D., Sec'y-Treas.

Addison's Disease Patients Improve on Synthetic Hormone

Small doses of a synthetic chemical have brought about general improvement and marked weight gains in seven patients suffering from severe Addison's disease, Drs. Kendall Emerson, Jr., George W. Thorn and H. Palmer Howard, of the Johns Hopkins University and Hospital, announced at the meeting of the Association for the Study of Internal Secretions in St. Louis.

In these cases, the chemical was given by injections under the skin, but the Hopkins doctors have previously reported good results when several months' supply of the chemical is made into a pellet like an aspirin tablet and buried in the fat around the shoulder blades. The operations in those cases, by Dr. Warfield M. Firor of the Hopkins surgical department, were performed under local anesthetic but with strict aseptic technic.

The chemical, desoxy-corticosterone acetate, is apparently the same material as the substance produced by the cortex of the adrenal glands. Without this vital gland product, life cannot go on. Addison's disease patients suffer from failure of the cortex of the adrenal glands, tiny organs near the kidneys, which makes them grow progressively weaker and more anemic and which turns their skins a grayish-brown color.

Extracts from the glands keep them alive, as insulin does diabetics, but the adrenal gland preparations are expensive, and in addition the patients must consume large quantities of salt because one feature of Addison's disease is dangerous loss of salt from the body.

The new chemical, prepared by a Swiss scientist,

(Concluded on page 632)

ARCHIVES of PHYSICAL THERAPY
OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

.·. EDITORIALS .·.

WAR AND PHYSICAL THERAPY

The famous Russian surgeon Pirogoff has aptly designated war as a traumatic epidemic. Another equally famous war surgeon, Ernst von Bergmann, has amplified this definition by describing war as an epidemic of infection. While the term "epidemic" is not to be taken literally, every major campaign especially during massive battles actually involves so many gunshot wounds, most of which soon become infected, that the medical formations near the firing line and the military hospitals in zones of the rear would be overwhelmed were it not for the schemes of organization of the medical officers and their subordinates, by which it becomes possible to afford professional aid to the greatest possible number within the shortest possible time. It should however be borne in mind that in the graver forms of injuries, irrespective whether they are produced by weapons or crude trauma, the immediate surgical aid is only a preliminary measure to long drawn out management of the after effects of such injuries. Thus in spite of modern asepsis and preventive sera, surgery on and behind the battlefield has been able in the majority of cases only to save human lives without adequate success in the restoration of functions.

Our experience in the World War has shown that thousands upon thousands of wounded soldiers would today be unable to earn a living were it not that in all armies the diverse medical units had established in the large war hospitals physical therapy departments in which great surcease was attained particularly in restoring ankylosed articulations or loss of function to fairly normal mobility and usefulness. With the actual arrest of infections of compound fractures produced by missiles from high powered rifles, parts of shells and other forms of trauma incident to modern warfare it was the medical officers charged with the conduct of physical therapy, who brought to realization what surgical art under the limitations imposed upon it by war could not achieve. The recognition by the military-naval authorities, both medical and line, that physical therapy actually saved man power has proved an impetus to its application in civil life for injuries resembling those sustained in war and for processes of an inflammatory nature with a pathologic basis indicating this form of conservation by therapy. Proof for this is seen in the fact that even during the years following the armistice of 1919, military hospitals in all civilized countries have physical therapy departments to which the highest authorities devote special attention with a view of furthering their development both in equipment and technics.

Whether one accepts the view that this experience in the Great War has proved the real impetus to the development of physical therapy in civil life or not, the fact remains that war experience is so vast in absolute clinical material as to have laid the foundation for the rationale of any and all physical measures in the treatment of a large variety of affections. It is an old experience that the researches made in time of peace prove of great value at a time when the medical profession is called upon to render aid to those wounded and injured in war, while reciprocally the experiences gained in such epidemics of trauma prove of equal value to the medical profession after peace has been restored. Taking these mutual lessons into account it would seem appropriate to designate war so far as physical therapy is concerned as the great clinic for human salvage.

It is hoped that so far as the profession in America is concerned it will never again be called upon to exercise its humanitarian function on sanguine battlefields. But as long as human nature continues to be what it is, that long must any nation not overlook the possibility if not probability of a war of magnitude and the instinct of self-preservation which is inherent in nations as in individuals, dictates the necessity of adequate preparation for any future emergency.

Physiatrists as much as surgeons and epidemiologists are in duty bound to prepare for the moment when they may have to exchange their civilian clothes for military uniform and become part and parcel of the forces going to battle for the preservation of national integrity. This implies that they must learn to think in numbers rather than individual cases, and become familiar with that part of medico-military organization which facilitates the effectiveness of massive treatment. When it is taken into consideration that the average physician in civil life considers the treatment of ten to fifteen patients a day's hard work one must realize what it will mean when suddenly hundreds are brought to him for care. Naturally the Government provides a limited number of commissioned assistants and enlisted technicians, but even with such help the department will be swamped unless the physiatrist in charge has the ability so to organize his own work and that of his subordinates as to meet all pressing demands on the part of those placed in his charge. Mere figures such as are provided by the official tables of organization, will prove lifeless, unless one has the vision and the talent to organize one's resources in personnel and material to comply with the military principle of caring for the largest possible number within the shortest possible period.

Apart from the purely military aspect of this problem one must prepare to meet also the scientific or technical problems affecting the service of physical therapy in war. It hardly needs proof that the traumatic epidemics in war produce injuries which are rarely if ever seen in times of peace. Even when one sees in a hospital the occasional late effects of a gunshot wound in civil life, these are usually produced by small hand weapons, and the injuries themselves are minimal as compared with those one sees in times of war. When it is taken into account that not only jacketed bullets but shrapnel and high explosive shells bursting into ragged fragments are hurled against human bodies to produce mutilation rather than wounds, then one can visualize the enormity of the problems which will confront the surgeons and then the physical therapeutists. Indeed, to the uninitiated such mutilations may at first glance appear almost hopeless from the standpoint of therapeutic success, yet it must be taken into consideration that in the last campaign our medical officers met these huge problems with determination and a modicum of success. The duty of the medical profession in any future contingency will be to enhance these results, and this not only from a purely humanitarian standpoint but from that of the greater interest to the State.

It follows that this technical knowledge must be acquired not after the guns have begun to speak but while there is time during the hours of peace. It is only by a careful study of war wounds and injuries that have been recorded in official publications and in manuals on military surgery that with the grounding specialists in physical therapy possess they should be capable of planning their measures for similar contingencies. This we feel is today under existing political conditions a patriotic duty which we are sure every able-bodied member of our profession will fulfill wholeheartedly. There is all the more reason for this when it is considered that during the years 1914 to 1918 the facilities for physical therapy were far less developed than they are today. True, the funda-

mental principles of applying heat, electrical stimulation, massage, manipulation, corrective exercise and the like, are the same today as they were then, and unquestionably will remain unchanged for perhaps all time to come; but in the application of these measures the technical and mechanical development has been so pronounced that our military forces may look forward to even better care than was accorded them during the World War. At this time it may not be amiss to emphasize one particular phase now at our command that was unavailable in the last war; namely, chronaxia. Its value to be sure will be diagnostic rather than therapeutic, but those familiar with it will have an opportunity for doing an immeasurable amount of good in the prognosis of central and peripheral nerve lesions unattainable by the usual neurologic measures. This is but one example of many to illustrate the important role that physical therapy will play in war, and in itself clearly demonstrates the need for adequate preparation in the cause of national defense.

Hospital Standardization of Physical Therapy

Hospitals are becoming more aware of the value of physical therapy in the treatment of certain diseases and find considerable use for such a department. The requirements as laid down by the American College of Surgeons in the Minimum Standard for Physical Therapy Departments in Hospitals will serve as a guide to hospitals desirous of organizing a modern physical therapy service. These requirements are explained in detail in the *Manual of Hospitalization.*

That the department be under competent medical supervision is most essential, as physical therapy must be properly administered and the best results are accomplished when the director is a medical graduate and has had special training in this field. Unskilled administration of treatment may produce harmful results.

Well trained technicians should be made available to assist the director in treating these cases. Registration with the American Registry of Physical Therapy Technicians as sponsored by the American Congress of Physical Therapy is improving the status of the physical therapy technician. Hospitals may protect themselves against unqualified personnel in this department by employing registered persons. The educational standards for technicians or aids have been well established by the American Physical Therapy Association.

Hospitals will find it advantageous to provide this form of treatment, which has most definite potential value in hastening convalescence and stabilizing end results. The limited number of qualified physical therapists available makes it necessary for several institutions in some instances to share the time of one specialist in this work. In organizing a service such as this, the American College of Surgeons offers its assistance. — Bull. A. M. Coll. Surgeons **24**:326 (Oct.) 1939.

Science, News, Comment

(Continued from page 628)

Dr. T. Reichstein of Zürich, can apparently take the place of the gland's own product. The patients at Johns Hopkins Hospital not only showed improvement in their general condition but careful tests showed normal conditions in their bodies. They could even get along with a low intake of salt. While the new chemical is now very costly and limited in quantity, there is hope that commercial production will bring the price down to the point where every Addison's disease sufferer can be given all he needs. — *Science News Letter.*

Feminized Roosters

Some of the masculinized hens that have been reported from time to time were probably, on the contrary, feminized roosters. Sex hormone studies indicating this were reported by Dr. L. V. Domm of the University of Chicago.

He injected estrin, the female sex hormone, into single comb brown Leghorn eggs during the second and fourth days of incubation and then let the eggs hatch and the chicks mature.

"The males of this experiment," Dr. Domm reported, "revealed an interesting sexual transformation. Some of the males appeared quite normal at this time while in others feminizing effects were evident in the plumage, but in none of our cases thus far observed has a complete henny plumage appeared during the first year.

"However, following the molt of the second summer many of them developed a henny plumage. A few again developed the plumage prevalent preceding the molt which was either cocky or intermediate. Head furnishings invariably became masculine in character though in some these have become more feminine with the change in plumage following the molt. Some of these birds are known to crow and tread. Others have not been known to display either type of behavior."

Post mortem examination of the sexually mature fowl revealed significant modifications of the sex organs toward the feminine type. — *Science News Letter.*

Gland Rules Food Use

The conversion of sugars, starches and proteins such as meat into fuel for body activity and into new body tissues is under the control of the tiny gland in the head called the pituitary.

Discovery of how this "master" gland controls both protein and carbohydrate metabolism was announced by Dr. C. N. H. Long, of Yale University School of Medicine.

The gland achieves its control over carbohydrates and proteins through three mechanisms as follows:

(1) Conversion of simple proteins into more complex ones in fed animals is speeded up or the breakdown of protein is slowed in fasted animals by one pituitary gland substance, probably the growth hormone.

(2) Another pituitary gland substance operates through the adrenal gland cortex to increase the breakdown of protein and consequently the formation of carbohydrates from protein or fat, in fasted animals. In fed animals this mechanism operates to diminish the proportion of carbohydrate oxidized.

(3) Utilization of carbohydrate in fed animals is checked by a pituitary gland factor which acts independently of any other gland factor. — *Science News Letter.*

Hormone for Old Men Rats

Old gentlemen rats that had lost their youthful vigor were stimulated to renewed activity when given doses of a female sex hormone, emmenin, and a special extract of the adrenal gland, Dr. R. G. Hoskins and associates, Helen M. Levene and Sylvia Bevin, of Harvard Medical School, reported. Other gland preparations and various vitamin preparations did not succeed in making lively fellows of the old rats. Why the adrenal and female sex hormones were effective has not yet been explained. — *Science News Letter.*

Pneumonia Prevention by Vaccination May be Possible

Pneumonia prevention by vaccination of all susceptible persons may be possible within three years, if the plan proposed at the Conference of State and Territorial Health Officers with the U. S. Public Health Service goes through.

The plan was proposed by Dr. Lloyd D. Felton, U. S. Public Health Service, in a report of the pneumonia vaccine he has prepared and which has been getting its preliminary trials on CCC men.

This vaccine can reduce the number of pneumonia cases at least one-half, Dr. Felton found by comparison with a similar group of non-vaccinated persons. The death rate can be reduced to at least that obtained by treatment of pneumonia with serum.

The vaccine, moreover, can apparently pick out in a group of people those who are especially susceptible to the ailment. Most persons vaccinated showed no reaction to the vaccine itself, but a few, about one-tenth, did have a reaction after the first dose of vaccine.

Dr. Felton's plan is to make skin tests with the vaccine of a large group of persons and to watch these people over a period of three years. The persons tested would be divided into two groups, those who reacted to the skin test and those who did not. If more pneumonia cases developed during the three years among the ones the test showed to be susceptible than among the other group, it would indicate that the test really picked the susceptibles.

With this as a basis, it would not be necessary to vaccinate the entire population against pneumonia. The ones needing the vaccination could be picked by preliminary skin testing, just as children needing toxoid to protect them against diphtheria are now picked by preliminary Schick testing. — *Science News Letter.*

THE STUDENT'S LIBRARY

FEVER THERAPY TECHNIQUE. By *Jack R. Ewalt*, M.D., Resident Psychiatrist, Colorado Psychopathic Hospital; Instructor in Psychiatry, University of Colorado School of Medicine, Denver; *Ernest H. Parsons*, M.D., Captain, Medical Corps, United States Army; Neuropsychiatrist, Sternberg General Hospital, Manilla, Philippine Islands; *Stafford L. Warren*, M.D., Associate Professor of Medicine in charge of Division of Radiology, University of Rochester, School of Medicine, Rochester, New York; and *Stafford L. Osborne*, B.P.E., M.S., Associate in Physical Therapy, Northwestern University School of Medicine, Chicago. Foreword by *Franklin G. Ebaugh*, M.D. Cloth. Pp. 161 with 16 illustrations. Price, $2.50. New York and London: Paul B. Hoeber, Inc., Medical Book Department of Harper & Bros., 1939.

This manual on fever therapy technic has been written by four of the most representative pioneers and authorities in answer to the increasing demand for a concise and simple guide on the subject. Each of these collaborators has by his contributions established his status as a keen and conservative student of the physiologic and clinical action of induced hyperpyrexia by modern electrophysical and chemotherapeutic methods. It is therefore a satisfaction to record that the anticipation of a well balanced exposition is fully confirmed on perusal of this the most recent of formal contributions on the value, action and clinical application of controlled fever in medical practice. The authors here presented in concise style the physiologic principles involved in systemic pyretotherapy and stressed for the benefit of clinicians and technicians the methods used in inducing and safely controlling sustained high temperature in certain diseases which heretofore have been found intractable to classic medication alone. The volume also contains information both in the nature of warnings as well as liberal guidance. And though the collaborators make no claims for priority or originality of treatment or technics as described in the text, there is evidence that much that has been written on the subject has indirectly emanated from the pen of these authors or was inspired as a result of their labors. They early warn the reader of the difficulties and dangers of administering pyretotherapy by the uninitiated, and rightfully insist that such treatment must be under special supervision by trained nurses and physicians within the environment of a hospital. Accordingly, the scope of this treatise is restricted to a practical standardization of the use of artificial fever therapy based on an extensive experience. The authors review the principles of fever therapy and the various methods employed; namely, radiant energy, high frequency current, malaria, intravenous typhoid vaccine. A complete and detailed chapter is devoted to discussion of the all important factor of complications and the steps used to control minor and major reactions, such as apprehension, delirium, calcium deficiency and tetany, tachycardia, burns, jaundice, kidney damage, peripheral vascular collapse, heat stroke, cerebral edema, vascular accidents, and the like. Chapter ten briefly expatiates on therapeutic dosage and lists a group of eleven diseases in which treatment has been found of special value. This chapter also includes a discussion of contraindications and suggests the type of history and clinical examination that is essential prior to treatment. From what has been said it becomes obvious that because fever therapy has demonstrated its special worth in certain clinical maladies it is important that treatment be administered by capable and oriented individuals under a standard method that is acceptable and recommended by authorities in the field. Such a manual for guidance of physicians and nurses is presented by this authoritative group and will be found highly practical by practitioners of fever therapy.

THE 1939 YEAR BOOK OF PHYSICAL MEDICINE. Edited by *Richard Kovacs*, M.D., Clinical Professor and Director of Physical Therapy, New York Polyclinic Medical School and Hospital, etc., etc. Cloth. Pp. 467 with 155 illustrations. Price, $2.50. Chicago: The Year Book Publishers, Inc., 1939.

The second number of the Year Book of Physical Therapy is bound to arouse the approval and admiration of the medical profession. It is one of the most balanced literary products on the subject and as informative as it is practical. Its scope is world-wide and combines excellent judgment in the selection of the domestic and foreign literature. As in the previous volume, the Editor has attempted to abstract only those contributions of the past year which in his broad experience were considered as new developments in basic research and practical in application. It is therefore interesting to record that the present year book contains 263 critically selected and detailed abstracts on nearly every phase of physical therapy. It offers information on latest and most approved methods and their clinical application in numerous diseases. The 155 illustrations attempt to demonstrate "what-and-how-to-do-it" with reference to special technic, equipment, diagnostic guidance, and results obtained in interesting cases. The work therefore embodies many desirable advantages. It offers a clear perspective of the advances in physical therapy, it gives the clinician and technician a broader orientation of the actual progress and practical possibilities of methods already evaluated, and provides the specialistic student with a cumulative international reference of the latest trends and progress in physical therapy. This work is warmly endorsed as a "must" book for the profession, because it is a veritable treasure house of information.

THE CLINICAL AND EXPERIMENTAL USE OF SULFANILAMIDE, SULFAPYRIDINE AND ALLIED COMPOUNDS. By *Perrin H. Long*, M.D., Associate Professor of Medicine, The School of Medicine, the Johns Hopkins University, etc.; and *Eleanore A. Bliss*, Sc. D., Fellow in Medicine, The School of Medicine, the Johns Hopkins University. Cloth. Pp. 319. Price, $3.50. New York: Macmillan & Co., 1939.

Seldom has a chemotherapeutic product so stirred the imagination and hopes of a conservative profession as the first report of the use of prontosil by Foerster some six years ago in staphylococcic sepsis. Since then sulfanilamide and the newer or allied compounds have demonstrated their impressive clinical potentialities in streptococcic, meningococcic, gonococcic, pneumonococcic and other types of infections. This monograph, written by two of the foremost pioneers and research workers in this field is therefore a timely contribution and is assured the largest reading audience on this much to be known and epochal therapy. It is recalled that the authors have established a wide reputation in both the experimental and clinical uses of sulfanilamide and that Long more than any other American investigator is today credited with the development of the system of this therapy now employed by clinicians. In the short period of but six years a tremendous amount of effective laboratory and clinical observations has been reported in the scientific literature. This volume attempts to correlate and summarize these extensive contributions and to present to the profession a concise review of the accumulated knowledge on the subject. Indeed, the practicality of such an objective becomes all the more obvious when it is realized that today our knowledge regarding the fundamental mechanism of the action of this drug in respect to the infecting organism and the host is as meagre as is our certainty of its rising popularity in clinical practice. The text proper is classified into eight chapters, and an appended index of authors and subjects. The authors review the historic barckground of sulfanilamide therapy; evaluate the experimental evidence from its bacteriologic and toxico-pharmacologic aspects; its mode and derivative action, and discuss the general and special clinical effects of the separate uses of this organic sulfur-containing chemotherapeutic agent and its allied compounds. The exposition is lucid, critical, analytical and presents the most scholarly review of this subject in any language. At the end of each chapter is listed an extensive bibliography, the size of which reaches the encyclopedic number of 957, and reflects the tremendous detail and labor that was expended into the creation of this monograph. To those who like their mental pabulum served in a diluted form, this volume may appeal as heavy and monotonous but it is said in its defense that its value will be especially appreciated by students and clinicians because of the intensive scholarship and solid substance with which this work is packed. This book is recommended to students and clinicians as the most informative review and exposition on the uses of the most important chemotherapeutic product in modern medicine.

A SYMPOSIUM ON CANCER. Addresses by *Leiv Kreyberg, Clarence C. Little, Madge T. Macklin, Edgar Allen, Howard B. Andervont, James Ewing, Gioacchino Failla, Henri Coutard, Warren H. Lewis, Stanley P. Reimann, James B. Murphy*, and *Emil Novak*. Cloth. Pp. 202 with 17 illustrations. Madison: The University of Wisconsin Press, 1938.

This volume consists of eighteen addresses recently delivered as a symposium on cancer by American and foreign researchers under the auspices of the medical school of the University of Wisconsin. Most of these are more or less detailed accounts of special investigations of an experimental character, the remainder being devoted to the clinical aspects of the cancer problem. Of particular interest is the attention paid to biopsy. With due respect to the authority of Dr. Ewing one cannot fully agree with his dictum that in large tumors the proper method is to incise directly into the tumor for the purpose of excising tissue for microscopic study as devoid of any risk of disseminating cancer cells. Nothing is said about the electrosurgical method of excising tissue for such purpose. With relation to the early diagnosis of cervical diagnosis Novak takes a similar stand, though he also points out the advisability of amputating the cervix in order to afford the pathologist the proper material for exact diagnosis. While he discusses colposcopy and the Schilling test as diagnostic means, either singly or combined, he does not consider them reliable and prefers histologic methods for diagnosis. It is natural that radiologists, such as Coutard, should favor x-ray and radium as the best methods of managing cancer, particularly of the breast. Novak, as a gynecologic surgeon, frankly discusses pro and contra radical hysterectomy in cancer of the cervix and properly teaches that each method, alone or in combination, has its place under given conditions, individualization being the proper solution of the problem. The addresses devoted to the experimental production of cancer and to the investigations concerning its nature as developed in the laboratory are without exception erudite and authoritative, presenting as they do the present day concepts of the concerned problems in their various phases. One misses an index in this otherwise well gotten up volume, the individual addresses of which must be read with care because they mirror the fruits of years of painstaking labors in many fields. All interested in the status of cancer in the light of modern research will find in this small book much valuable information and food for thought even so far as concerns its practical use

INTERNATIONAL ABSTRACTS

The Problem of Arthritis. Albert Weinstein.
J. Tennessee M. A. **32**:113 (April) 1939.

The elevation of the body temperature by means of typhoid vaccine intravenously, diathermy, or fever machines results in a temporary increase in the blood supply to the joints and temporary relief from joint pains. However, no permanent improvement follows pyretotherapy, and it is generally agreed that this form of treatment is of but little value. The use of hot wet packs locally, or of heat from infra-red lamps, accomplishes as much and with less danger and expense. The greatest benefit is, however, obtained by the judicious use of physical measures. The aid afforded by hydrotherapy, careful massage, paraffin baths, and so forth, for maintenance of muscle tone, encouragement of local vascularity, and preservation of the function of joints and adjacent tissue is of greatest importance.

Thrombophlebitis and Iontophoresis. R. A. Sokolov, and M. P. Myers.

Am. Heart J. **17**:316 (March) 1939.

Acetyl-beta-methylcholine chloride iontophoresis was employed by Sokolov and Meyers in the treatment of nineteen cases of thrombophlebitis of the deep veins and thirteen cases of chronic leg ulcers of various origin. Some of the patients were from the out-patient department while others were private patients referred to the peripheral vascular department of the hospital. The majority of the patients were ambulatory. The shortest duration of the thrombophlebitis among the patients treated was eight days, the longest thirty-two years. Improvement was observed in eighteen of the nineteen cases. The majority of the patients were able to return to full-time work, some at hard manual labor. Others were only partially rehabilitated. In one patient pain and disability, which had been present for thirty years disappeared completely. Many of the patients had had various other forms of treatment over a period of years without relief. The most definite improvement took place in instances in which the disease was of short duration. When the disease had been present for a number of years, improvement was slow and less dramatic. Improvement may not manifest itself until several treatments have been given. It is not unusual, especially in the cases of old chronic phlebitis, to see no alteration in the disease process until a considerable period has elapsed and then suddenly to observe beneficial changes taking place. In fresh postoperative cases the results were at times quite dramatic. One precaution which was observed in treating open lesions of the skin by iontophoresis was that the ulcerated area itself was covered with a thin piece of rubber sheeting. If this is neglected the current is likely to concentrate at the point of ulceration, which may cause pain and further destruction of tissue. Of the thirteen cases of chronic leg ulcers, twelve lesions had healed completely and the thirteenth lesion was healing rapidly when last observed. — [Abst. J. A. M. A. **112**:2359 (June 3) 1939.]

Nerve Excitation by High Frequency Alternating Current. Bernhard Katz.

J. Physiol. **96**:202 (July 14) 1939.

Excitation by high frequency alternating current was used to investigate the effect on frogs' medullated nerve. A method is described ("fluctuating" alternating current) which ensures a constant low rate of nerve impulses independent of the frequency of the applied alternating current. In this way, the onset of a refractory condition, during steady stimulation, can be avoided.

At high frequency, marked divergences from the existing theories are observed, in agreement with previous experimental findings. These can be interpreted as the consequency of a local response, present with subliminal stimulation (Rushton, Hodgkins, et al.) and supporting the excitatory effect of the cathodal half-cycles.

The relation between threshold intensity and frequency was studied in detail. It diverged, at high frequencies, from Hill's "local potential" theory. The stimulating power of a steady high frequency alternating current was nearly 100 per cent higher than predicted. This divergence began in a frog's nerve (room temperature), at 500-700 per second and was completed at about 5000 per second.

This result can be obtained in three independent ways: (1) from the intensity-frequency relation itself; (2) from a comparison between high-frequency alternating current and single short condenser discharges; (3) from a comparison between "steady" and "optimum initial" effect of high frequency alternating current. Corresponding phenomena are obtained with short two-way condenser discharges of high frequency.

It is suggested that the asymmetrical effects of two opposite half-cycles (with anodal shocks, "local potential" only; with cathodal shocks, "local potential + local response) account for a local summation with alternating stimuli. This would explain the relative increase of the excitatory effect at high frequencies.

This phenomenon becomes greatly enhanced with a small inter-electrode distance. In this case, a spatial summation of the local excitatory events takes place, the local response at one electrode reinforcing that at the other, in addition to their progressive growth during successive cycles.

The Effects of Ultraviolet Radiation on Spores of the Fungus Aspergillus Niger. Paul A. Zahl; L. R. Koller, and C. P. Haskins.

Gen. Physiol. **22**:689 (July 20) 1939.

Laboratory studies conducted on living material result in certain important implications that are often paralleled in the human. In order to determine the effects of humidity and germination, the authors applied two factors in ultraviolet radiations as a guide to the interpretation of the morphologic changes that ensued. These were wavelengths and the reciprocal of the depth of a solution required to reduce the intensity of light of a given wavelength to one-tenth of that which it had on entering. Accordingly they found:

The survival ratio of *Aspergillus* spores exposed to ultraviolet radiation has been measured as a function of total incident energy for wavelengths of 2537Å, 3022Å, 3129Å, and 3650Å.

The effect of humidity on killing of *Aspergillus* spores by ultraviolet radiation has been found to be negligible.

A delay in germination as a result of irradiation has been found.

The Bunsen-Roscoe reciprocity law has been found to hold within the limits of the radiation intensities studied.

Certain morphological changes have been observed.

Tuberculosis of the Conjunctiva. Walter H. McKenzie.

Am. J. Ophth. **22**:744 (July) 1939.

The conjunctival and skin lesions are not influenced and continue to spread under symptomatic and general treatment. Surgical removal and cauterization were discarded temporarily because of the positive resulting mutilating effects. Within one month after x-ray therapy had been instituted, the hypertrophied papules had disappeared, the skin and conjunctiva (though scarred) were assuming a fairly normal appearance. However, the upper eyelid suffered a flare-up of activity in February, 1938, while the lower lid remained quiet. Further x-ray treatments were given and greater efforts made to improve the patient's general health with increased dosages of cod liver oil, rest, sunshine, plus the drinking of milk and fruit juices.

Gonorrhea Today. Robert P. Parsons.

U. S. Nav. M. Bull. **37**:67 (Jan.) 1939.

While gonococcic arthritis complicates only about one case in fifty, each makes about 50 times the impression on both doctor and patient. In naval experience these patients have been costing about 60 sick days each. Two forms of treatment which have come into use during the present decade, appear to offer great promise in a remarkable reduction of sick days and in removing the features of this complication which formerly made us view it with such dread. The new treatments are artificial fever and sulfanilamide.

The great trouble with fever therapy in its present state of development is that when it is carried high enough to give a fair certainty of cure it may get out of bounds and out of control. This therapy utilizes a procedure that has mortality possibilities for a disease which in itself has no mortality. Newer refinements in technic lead us to hope that this will eventually become a safe and very helpful form of therapy for such heretofore worrisome complications as arthritis, prostate and vesicle infections, and female pelvic infections.

As for sulfanilamide, our experience has been quite limited with arthritis, but we have come to expect one of two things with this drug in arthritis as in other gonococcic disorders — either a miraculous cure in a very few days or that the course of the disease will remain entirely uninfluenced. The proportion of arthritis cases showing remarkable benefit from sulfanilamide seems to be about 50 per cent, but our own series and other reported series are so small that present conclusions on this point may be quite erroneous.

Hypersensitiveness to Cold With Paradoxical, Adrenalin-Like Systemic Reaction. B. T. Horton, and Grace M. Roth.

Pro. Staff Meet. Mayo Clin. **14**:419 (July 5) 1939.

Hypersensitiveness to cold with local and systemic histamine-like reactions constitutes a well defined clinical syndrome which the authors described fully in previous communications. Following exposure to cold, the local effects on the skin are pallor during the period of exposure, followed by redness, swelling and increased heat of the hands after removal from the cold environment. After a latent period of three to four minutes, a distinctive systemic reaction appears which is characteristic of that produced by histamine. The blood pressure falls, the pulse rate increases sharply, flushing of the face and a tendency to syncope with transitory recovery in fifteen to thirty minutes occur. Our experimental studies demonstrate consistantly that a histamine-like substance is liberated in the skin following exposure to cold; this substance, when carried into the general circulation, produces a reaction characteristic of histamine. If the substance is not histamine, it is so akin to histamine that the difference is not recognizable.

Horton and Roth report the history of a patient that had the usual local response to cold in whom the systemic reaction was characterized by a marked rise in the blood pressure in contrast to the usual drop in blood pressure observed in other cases of hypersensitiveness to cold. This is the first case in which they observed such a paradoxical reaction, and had not seen similar reports in the literature.

(Concluded on page 652)

Special Article

AMERICAN REGISTRY OF PHYSICAL THERAPY TECHNICIANS

CHICAGO

The following revised outline of the rules, regulations and ethics of the American Registry of Physical Therapy Technicians is submitted in answer to the frequent inquiries for its re-publication. It is hoped that this edition will be found even more informative than its predecessor because outside of incidental but yet important changes in the official plan of the Registry it includes a directory of its members and their addresses. It is intended as a concise and ready reference of the scope and operative plan to control any possible exigency that may develop in the relationship of institutional and private physical therapy practice so far as it concerns the technician. It briefly reviews and enumerates the plan adopted by the Board for an equitable relationship between technician and physician. Accordingly it calls attention to nine important objectives of the Registry; namely, the name and purposes of this organization; the selection and duties of the members forming the Board; methods for certification of applicant; registration and the status of the registrant; control of certified members and the code of ethics adopted for the broadest good to all concerned.

Name

The Registry shall be known as the American Registry of Physical Therapy Technicians. It shall be directed by a Board composed of seven members.

Objects

The objects of the Registry are:

1. To receive applications for and issue certificates of registration to those who meet the educational and technical qualifications as given under "Eligibility for Certification."

2. To maintain the minimum standards of educational and technical qualifications as given by the Council on Medical Education and Hospitals of the American Medical Association for technicians administering physical therapy in hospitals, clinics and physicians' offices.

3. To cooperate with the Council on Medical Education and Hospitals of the American Medical Association in their investigation, classification, and periodical inspection of schools which conduct training courses for physical therapy technicians.

4. To conduct a placement bureau for registered physical therapy technicians and junior physical therapy technicians.

5. To promote the use of these registered physical therapy technicians and junior registered physical therapy technicians in hospitals and physicians' offices.

6. To cultivate high ethical standards among physical therapy technicians in accordance with the Code of Ethics.

Board of Registry

1. The Board of Registry shall be composed of seven members (which number shall include the chairman) to be appointed by the President of the American Congress of Physical Therapy. Only those members of the American Congress of Physical Therapy shall be appointed as members of this Board who practice physical therapy exclusively. These members shall be geographically located so as to represent the important centers of physical therapy activity in the United States. The members of the Board shall be appointed for a period of seven, six, five, four, three, two, and one year respectively. There shall be one new appointment each year and all appointments shall be subject to the verification of the American Congress of Physical Therapy.

2. There shall be an advisory board composed of representatives from national organizations interested in the work of physical therapy technicians and the physicians who use physical therapy in their specialties. This advisory board shall be composed of seven members and include one representative from each of the following organizations: The American Physiotherapy Association, the American Hospital Associa-

tion, the American Orthopedic Association, and the American Neurological Association, the remaining three to be elected by the American Congress of Physical Therapy. The appointments shall be made by the represented Associations themselves, and the length of the term shall be four years. The other three members shall be physicians specializing in physical therapy.

3. The duties of the Board of Registry.

a. The Board of Registry shall pass on all applicants for registration before they are admitted to examinations.

b. The Board of Registry shall arrange for the necessary examinations. These examinations shall be conducted by the Board at the annual meeting of the American Congress of Physical Therapy, or at the discretion of the chairman of the Board of Registry. He may authorize the holding of examinations by any member of the Board of Registry, who is then to act as chairman of a regional board. This regional board shall have the written approval of the chairman of the Board of Registry.

The regional board shall be composed of two or more members, according to the local requirements. The members of the regional board are appointed by the Board member (chairman of the regional board) and his selection shall have the written approval of the chairman of the Board of Registry.

c. Questions for written and oral examinations together with directions for practical demonstrations shall be prepared by the Board of Registry or a committee of that board in collaboration with the advisory board.

d. It shall issue yearly a full list of registered physical therapy technicians and junior registered physical therapy technicians, classified alphabetically and geographically. This directory shall specify the qualifications for eligibility for certification.

Applications for Registration

Upon request, the registrar will furnish blanks on which formal applications are made for certification, with data to be filled in giving information as to the applicant's preliminary education, technical education, experience in physical therapy, training and experience in related fields, and references from two licensed physicians.

Eligibility for Certification

There will be two classes for certification:

A. Physical Therapy Technicians.

1. Applicants who graduated from an approved school of physical therapy. The Board shall accept as approved those schools passed by the Council on Medical Education and Hospitals of the American Medical Association (table 1).

Examination: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in all branches of physical therapy.

Written examination covering all branches of physical therapy. The results of these written examinations shall be inspected and approved by all members of the board.

B. Junior Physical Therapy Technicians. Applicants who have completed high school education and have had four years of experience in physical therapy under the supervision of qualified physicians. These applicants shall be required to pass written, oral and practical examinations of a more limited scope. Applications for registration under this classification will not be considered after January 1, 1940.

Examination: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in at least one branch of physical therapy.

Written examination covering fundamental subjects. At least elementary knowledge of anatomy and physiology and pathology of diseases commonly coming under treatment of physical therapy.

Registration

Candidates for registration as physical therapy technicians shall make formal application on blanks provided by the Registrar.

Upon receipt of an application, the Registrar shall conduct a preliminary investigation of the applicant and the result shall be filed with the application.

The fee for registration is $10.00. The fee is not returnable in case of failure in examination.

The applicant may, at the discretion of the Board, be given the privilege of another examination without additional charge.

There shall be an annual registration fee of $2.00.

TABLE 1. — *Schools Approved for Training Physical Therapy Technicians* *
By the Council on Medical Education and Hospitals

Name and Location of School	Direction	Entrance Requirements	Duration of Course	Time of Admission	No. of Students Admitted Annually	Tuition	Certificate, Diploma, Degree
California Hospital, Los Angeles[1]	G. P. Jennings, M.D.	(a) R.N. (b) Grad. phys. ed.	18 mos.	Jan. & July	6	$200	Certificate
Children's Hospital, Los Angeles[2]	J. C. Wilson, M.D.	(a) R.N. (b) Grad. phys. ed.	15 mos.	Sept.	12	$150	Diploma
Stanford University Hospitals, San Francisco	W. H. Northway, M.D.	(a) R.N. (b) Grad. phys. ed.	12 mos.	Apr. & Oct.	12	$215	Certificate
Walter Reed General Hospital, Washington, D.C.[3]	A. A. de Lorimier, Capt., M.C.	Grad. phys. ed.	12 mos.	Sept.	10	None	Certificate
Northwestern University Medical School, Chicago[4]	J. S. Coulter, M.D.	(a) R.N. (b) Grad. phys. ed. (c) 3 yrs. coll.	9 mos.	Oct.	16	$200	Certificate
Bouvé-Boston School of Physical Education, Boston[5]	Howard Moore, M.D.	High sch. grad.	3 and 4 yrs.a	Sept.	10	$400 yr.	Diploma or B.S.
Harvard Medical School, Course 445, Boston[6]	F. R. Ober, M.D.	(a) R.N. (b) Grad. phys. ed. (c) Coll grad.	9 mos.	Jan. & Sept.	18	$150	Certificate
Boston University, Sargent College of Physical Education, Cambridge, Mass.[7]	Prof. E. Hermann, Dean	High sch. grad.	4 yrs.	Oct.	12	$350 yr.	B.S.
Posse School, Kendal Green, Mass.[8]	W. F. Carlson, President	High sch. grad.	3 and 4 yrs.b	Sept.	9	$400 yr.	Diploma or B.S.
Mayo Clinic, Rochester, Minn.[9]	F. H. Krusen, M.D.	(a) R.N. (b) Grad. phys. ed. (c) 2 yrs. coll.	12 mos.	Oct.	15	None	Certificate
St. Louis University School of Nursing, St. Louis[10]	A. J. Kotkis, M.D.	High sch. grad.	4 yrs.	Sept.	2	Univ. fees	B.S.
University of Buffalo, Buffalo[11]	G. G. Martin, M.D.	R.N.	18 mos.	.....	8	Univ. fees	B.S.
New York Society for the Relief of the Ruptured and Crippled, New York City[12]	K. G. Hansson, M.D.	(a) R.N. (b) Grad. phys. ed.	9 mos.	Sept.	20	$300	Diploma
D. T. Watson School of Physiotherapy (affiliated with University of Pittsburgh School of Medicine,) Leetsdale, Pa.[13]	Jessie Wright, M.D.	(a) Grad. phys. ed. (b) 2 yrs. premed.	22 mos.	Sept.	8	None	Diploma or B.S.
College of William and Mary, Richmond, Va.[14]	H. H. Hibbs, Jr., Ph.D., Dean	(a) R.N. (b) Grad. phys. ed. (c) 3 yrs. coll.	9 and 12 mos.c	Sept.	10	Coll. fees	Certificate
University of Wisconsin, Madison[15]	E. A. Pohle, M.D.	(a) R.N. (b) Grad. phys. ed.	9-12 mos.	d	20	Univ. fees	Certificate

Affiliated Clinical Facilities

1. Glendale Sanitarium and Hospital, Glendale, and Los Angeles County Hospital and Orthopedic Hospital, Los Angeles.
2. Cedars of Lebanon Hospital, Los Angeles County Hospital, and Presbyterian Hospital — Olmsted Memorial, Los Angeles . . . and others.
3. Langdon School for Crippled Children, Washington, D. C.
4. Michael Reese Hospital, Passavant Memorial Hospital, and St. Luke's Hospital, Chicago . . . and others.
5. Boston City Hospital, Children's Hospital, Massachusetts General Hospital, and Robert Breck Brigham Hospital, Boston . . . and others.
6. Children's Hospital, Harvard Infantile Paralysis Commission Clinic, Industrial School for Crippled and Deformed Children, and Massachusetts General Hospital, Boston . . . and others.
7. Massachusetts General Hospital, Massachusetts Memorial Hospital, and Perkins Institute for the Blind, Boston, and Cambridge Hospital, Cambridge . . . and others.
8. Ring Sanatorium and Hospital, Arlington Heights, and Beth-Israel Hospital and Industrial School for Crippled and Deformed Children, Boston . . . and others.
9. Colonial Hospital, Kahler Hospital, St. Mary's Hospital, and Worrall Hospital, Rochester.
10. Firmin Desloge Hospital, St. Louis.
11. Buffalo City Hospital, Buffalo.
12. French Hospital, and New York Hospital, New York City.
13. Allegheny General Hospital, Children's Hospital, Falk Clinic, and St. Francis Hospital, Pittsburgh . . . and others.
14. University of Virginia Hospital, Charlottesville, and Crippled Children's Hospital, Stuart Circle Hospital, and Wheeldon Clinic, Richmond . . . and others.
15. State of Wisconsin General Hospital, and Wisconsin Orthopedic Hospital for Children, Madison.

Notes

a. Four year course leads to B.S. degree from Simmons College.
b. Four year course leads to B.S. degree from State Teachers College, Hyannis.
c. Twelve months' course for those with three years of college.
d. Preferably in summer semester.

* Reprinted from *The Journal of the American Medical Association*, **112**:928 (March 11) 1939.

Title of Registrant

The certificate issued by the Board of Registry designating the holder as "Physical Therapy Technician," signifies a person who is qualified to administer physical therapy on the prescription of a qualified physician and who has fully met the minimum educational requirements and who has passed the examinations of the Board of Registry.

The certificate issued by this board designating the holder as "Junior Physical Therapy Technician" signifies a person who is qualified to assist a physician in administering physical therapy, and who has met the minimum education requirements and duly passed the examination as herein provided.

Holders of certificates may use the letters R. P. T. T. (Registered Physical Therapy Technician) or Jr. R. P. T. T. (designating Junior Registered Physical Therapy Technician) after their name.

There is an official pin, as well as an official sleeve emblem. Holders of certificates may obtain either or both at a nominal charge.

All registered technicians shall be permitted to attend without cost sectional and annual meetings of the American Congress of Physical Therapy on the same basis of cost as the regular members.

Revocation of Certificate

A certificate may be revoked at any time for cause at the discretion of the Board of Registry. A hearing shall be granted upon request.

Candidates shall agree before admission to the register that they will at all times work under the supervision of a physician and that he or she shall not establish a private practice in physical therapy. Supervision by a physician shall be actual and not perfunctory. Registrants found to be practicing physical therapy independently of medical supervision shall be removed from the registry.

Incompetence and unbecoming conduct as determined by the Board of Registry shall constitute grounds for revocation of certificate.

An open hearing and adequate defense shall be satisfied by the following conditions:

1. The complaint must be made in writing to the chairman of the regional board who shall conduct a preliminary hearing.

2. The registrant must receive notification of this complaint at least twenty days in advance of the date set for the hearing. The notification is to be made by registered mail, telegram, radiogram or cablegram.

Appeal from the decision of the regional board may be made to the Board of Registry at the annual convention of the Congress. Such an appeal must be made in writing to the national chairman addressed in care of the American Congress of Physical Therapy, not later than thirty days prior to the opening date of the forth-coming convention.

Reinstatement shall depend upon approval of the regional committee with final approval of the Board of Registry.

Code of Ethics

All registered technicians and assistants shall be required to strictly observe the Code of Ethics as defined by the American Congress of Physical Therapy; namely, that they shall practice only under the prescription and direction of a licensed physician and shall under no circumstances on their own initiative treat patients or operate an office independently.

30 North Michigan Avenue.

DIRECTORY OF TECHNICIANS

In this directory the names are listed geographically, and alphabetically within each state. "Jr." appearing in parenthesis following a name designates a junior physical therapy technician. All others are senior physical therapy technicians.

Alabama

Close, Miss Jane, 2430 11th Ave., N., Birmingham.
Dean, Miss Jennie, 1843 S. 16th Ave., Birmingham.

Arizona

Brown, Miss Jefferson I., 1831 E. Third St., Tucson.
Fee, Miss Helen L., (Jr.), Desert Sanatorium, Tucson.
Hansen, Miss Emma, County Hospital, Tucson.
Miller, Miss B. Claire, (Jr.), Desert Sanatorium Tucson.
Oleson, Miss Alyce L., 309 W. Holly, Phoenix.

Arkansas

Hallbom, Mr. Gustav, Fordyce Baths, Hot Springs National Park.
Harrison, Miss Virginia V., Army and Navy Hospital, Hot Springs.

Hockenberger, Miss Margaret Ada, 519 W. Fourth St., Little Rock.
Larson, Miss Geraldine, 1710 Maryland, Little Rock.
Lawrence, Miss Mary S., Army and Navy General Hospital, Hot Springs.
Lura, Miss Edna, Army and Navy General Hospital, Hot Springs.

California

Abel, Miss Alice Anne, 1424 Palm Drive, Bakersfield.
Anderson, Miss Evelyn, 5 Rico Way, San Francisco.
Andrews, Miss Margaret, 3610 W. 17th St., Los Angeles.
Ashbaugh, Miss Helen S., 1242 N. Berendo St., Los Angeles.
Atsatt, Mrs. Luella Ely, 849 Mission Canyon Rd., Santa Barbara.
Aust, Miss Ruth, 2130 Leavenworth, Pasadena.
Ballard, Miss Charlotte Hawkes, 1900 Leavenworth St., San Francisco
Bauman, Miss Charlotte, 603 Prospect Row, San Mateo.
Behlow, Miss Dorothy, 920 N. Electric Ave., Alhambra.
Benson, Miss Grace, 2590 Sacramento St., San Francisco
Bernhard, Miss Bess Doolittle, 2424 S. Flower, Los Angeles.
Bier, Miss Kathryn Scholle, 125 Bellefontaine, Pasadena.
Bierkle, Mr. Arthur Micklos, 205 S. Mission Dr., San Gabriel.
Blake, Miss Margaret, 1801 S. Orange Dr., Los Angeles.
Bornfell, Mr. Albert, 2140 N. Arroyo Blvd., Pasadena.
Boxeth, Miss Mathea A., 1680 N. Vine St., Hollywood
Brinkman, Mrs. Philena B., 1564 Vista St., Oakland.
Broemser, Mrs. Berenice E., 1270 N. Cummings St., Los Angeles.
Brummer, Miss Margaret, 1242 N. Berendo St., Apt 8, Los Angeles.
Buehler, Miss Vida L., 227 N. Rosemont, Los Angeles.
Burrell, Miss Florence C., 230 Grand Ave., Oakland.
Busck, Miss Gerda, 5128 Cavanagh Rd., Los Angeles.
Cameron, Mrs. Dorothy, 1160 S. Keniston Ave., Los Angeles.
Campbell, Mr. George L., Olive View Sanatorium, Olive View.
Cannon, Miss Jennie M. (Jr.), St. Joseph Hospital, Orange.
Carlson, Mr. Albert H. (Jr.), 1702½ E. Glen Oaks, Glendale.
Carr, Mr. L. A., 3616 Main St., Riverside.
Dahlgren, Mrs. Ellen R., 357 S. Alvarado St., Los Angeles.
Darrow, Mrs. May Goodall, 2212 Parker, Berkeley.
Daughters, Mr. Kenneth V., 1956 Hospital Pl., Los Angeles.
Daughters, Mrs. Marguerite A. (Jr.), 1956 Hospital Pl., Los Angeles.
Dennis, Miss Vera A., 669 S. Union Ave., Los Angeles.
Dooley, Miss Leita H., 220 N. Almont, Beverly Hills.
Drake, Mr. Philip Sanford, c/o Dr. F. C. Ferry, 5718 Hollywood Blvd., Los Angeles.
Edwards, Mrs. Mildred Louise, 629 S. Bonnie Brae St., Los Angeles.
Ericson, Mrs. Lily Valley, 6408 Yucca St., Los Angeles.
Farris, Mrs. Edna E., 3345 Ledgewood Dr., Hollywood.
Field, Mr. Greydon Merle, 5607 S. Figueroa St., Los Angeles.
Fingalson, Miss Georgia Rodell, Palm Springs.
Fitzhugh, Mrs. Mabel L., 1755 Van Ness Ave., San Francisco.
Frazee, Miss Dorothy E., County Hospital, San Bernardino.
Furscott, Miss Hazel, 384 Post St., San Francisco.
Graham, Miss Lily Hartley, Children's Hospital, Los Angeles.
Graves, Miss Dorothy A., 1906 Rosemead Blvd., Rosemead.
Graves, Mrs. Eunice Mae, Children's Hospital, Los Angeles.
Guernsey, Mr. George Dee, 3235 Elmonte Way, Fresno.
Haigh, Mrs. Mabelle Schwalm, 4004 Franklin Ave., Los Angeles.
Hansen, Miss Ann, 1008 S. La Jolla Ave., Los Angeles.
Hart, Miss Loraine M., University of California Hospital, San Francisco.
Haugen, Miss Nina S., 445 Monterey Blvd., Hermosa Beach.
Henderson, Miss Stella M., 2803 N. Main St., Los Angeles.
Hoak, Miss Hazel M., 2200 Hayes, San Francisco.
Hume, Mr. Bruce Wallace, 5020 Sierra Villa Dr., Eagle Rock.
Hume, Mrs. Vera Garnett, 5020 Sierra Villa Dr., Eagle Rock.
Jaris, Mr. Leon (Jr.), 2001 Dwight Way, Berkeley.
Johnson, Mrs. Mollie, 1739 N. Mariposa Ave., Los Angeles.
Kaiser, Mrs. Lucy Searle, 10429 St. James Ave., South Gate.
Kaufman, Mr. G. R., 319 Stewart St., Loma Linda.
Kirkendall, Miss Margaret M., 120 Euclid Ave., Stockton.
Kish, Miss Mabel Esther, 2437 Stanislaus St., Apt. 11, Fresno.
Krase, Miss Leona Marie, Mercy Hospital, San Diego.
Levy, Miss Harriet Joyce, Woodland Clinic, Woodland.
Long, Mrs. Harriette McDowell, 2424 S. Flower, Los Angeles.
Loveren, Mr. Stillman M. (Jr.), 211 Cherry Ave., Long Beach.
Maashoff, Mr. Clinton C., 964 Estudillo Ave., San Leandro.
Martin, Mrs. Florence H., 632 Alta Vista Circle, South Pasadena.
McElrath, Mrs. Jessie E. (Jr.), 506 First Trust Bldg., Pasadena.
Middleton, Miss Jeanne, Box 13, Loma Linda.
Morby, Mrs. Sylvia M., 15 E. Valerio St., Santa Barbara.
Neff, Mrs. Gladdes B., 1660 Termino, Long Beach.
Nesbitt, Miss Mary Ewing, University of California Medical School, San Francisco.

Noonan, Mrs. Marian C., 507 Loma Dr., Los Angeles.
Oakley, Miss Helen, 1421 State St., Santa Barbara.
O'Brien, Mr. George S., 201 Medico-Dental Bldg., San Jose.
O'Dell, Mrs. Ruth Dunn, 707 "J" St., Eureka.
Owen, Miss Miriam, La Sierra Heights, Arlington.
Paull, Miss Helen G., 2653⅜ Ellendale Pl., Los Angeles.
Perrault, Miss Josephine, Olive View Sanatorium, Olive View.
Pike, Miss Esther M., 1231½ Amherst, Los Angeles.
Powers, Mr. Frank Edmonds, 712 N. Wilson Ave., Pasadena.
Rader, Miss Beulah S., Box 170, Montara.
Radig, Miss Martha L., 416 Hawthorne Ave., Oakland.
Rice, Miss Betty Arvilla, 5105 Dover St., Oakland.
Richards, Mrs. Mary Lee, 1220 N. Providencia St., Burbank.
Roberts, Mrs. Rhoda Ellen, 2843 "E" St., San Diego.
Roen, Miss Susan G., 2424 S. Flower, Los Angeles.
Russell, Miss Vera I., University of California Hospital, San Francisco.
Ryder, Mrs. Frances Helen, 746 S. Lake St., Los Angeles.
Sankey, Miss Cleora, 2030 N. Vermont Ave., Los Angeles.
Schmidt, Miss Bertha Barbara, Olive View Sanatorium, Olive View.
Scott, Miss Katherine A., 103 E. Micheltovena St., Santa Barbara.
Speck, Miss Marguerite (Jr.), Loma Linda.
Spillane, Mrs. Grace E., 1819¼ Midvale Ave., West Los Angeles.
Stevenson, Miss Margaret, 177 Post, San Francisco.
Stewart, Mrs. Maude Sedelia, 596 Drexel Pl., Pasadena.
Strother, Mrs. Esther Mott, Tulare County Hospital, Tulare.
Swanson, Miss Catherine May, 1720 Oakwoods Ave., Pasadena.
Tanner, Miss Dorothy, 730 "H" St., Eureka.
Tillotson, Mrs. Grace I., Olive View Sanatorium, Olive View.
Truman, Mr. Rolland, 612 Bellflower Blvd., Bellflower.
Tucker, Miss Lillie Frances, 1220 Providencia, Burbank
Tuggle, Miss Julia L., 2880 Jackson, San Francisco.
Utz, Miss Virginia Dare, Samuel Merritt Hospital, Oakland.
Wallace, Miss Catherine, 823 Monroe St., Santa Clara.
Ward, Miss Mabel, 1715 Pampas Ave., Santa Barbara.
Weeks, Miss Clarissa, Seaside Hospital, Long Beach.
Wells, Miss M. Caroline, 888 33rd Ave., San Francisco.
White, Miss Antoinette, 199 E. Calaveras, Altadena.
Williams, Miss Grace L., 1522 N. Rodney Dr., Hollywood.
Williams, Miss Marian, 516 N. Mariposa, Los Angeles.
Woodcock, Miss Beatrice Alice, 3700 California St., San Francisco.
Worthingham, Miss Catherine A., Stanford University, San Francisco.

Colorado

BenDure, Miss Mary L., Children's Hospital, Denver.
Bennett, Miss Catherine Ann, Children's Hospital, Denver.
Cabeen, Miss Lucile, Fitzsimons General Hospital, Denver.
Collins, Miss Marguerite Ellen, 4200 E. Ninth St., Denver.
Hibbert, Miss Ellen Ruth, Children's Hospital, Denver.
Lang, Mrs. E. Genevieve, 350 Gunnison Ave., Grand Junction.
Meyer, Miss Helen Maurine, 1358 Gilpin St., Denver.
Nordblom, Mrs. Olga, St. Luke's Hospital, Denver.
Robertson, Miss Barbara, Fitzsimons General Hospital, Denver.
Snook, Mrs. Mary E. Shannon, St. Mary Hospital, Pueblo.

Connecticut

Adams, Miss Martha, Pine Orchard.
Baumann, Miss Frances A., 1710 North Ave., Bridgeport.
Brown, Mrs. Carolyn Millard, 434 Temple St., New Haven.
Bullis, Miss Helen M., 405 Temple St., New Haven.
Bunce, Miss Louise, 51 Lawn Ave., Middletown.
Butterfield, Miss Eloise, 89 N. Main St., Wallingford.
Canivan, Mr. Charles C., 207 Preston St., Hartford.
Favor, Miss Mary E., 265 Washington Ave., Bridgeport.
Gleason, Miss Laura, 262 Bradley St., New Haven.
Grillo, Mrs. Mildred V. (Jr.), 295 Golden Hill St., Bridgeport.
Knoblock, Mrs. Florence Howard, (Jr.), 262 Bradley St., New Haven.
Langdon, Miss Doris T., State Dept. of Health, Hartford.
Leary, Miss Katherine D., 64 Garden St., Hartford.
Miller, Miss Bernice L., (Jr.), 473 Wolcott Hill R., Wethersfield.
Neely, Miss Esther C., 96 Broad St., Guilford.
O'Donnell, Mr. Edward D., Yale University Dept. of Health, New Haven.
Paulitsch, Miss Gladys D., 30 Second St., Stamford.
Sakowitz, Miss Beatrix (Jr.), 323 Orchard St., New Haven.
Shannon, Miss Audrey N., 45 Jackson St., Ansonia.
Wesely, Miss Mary, 121 S. Main St., South Norwalk.

Delaware

Weigele, Miss Clara M., Homeopathic Hospital, Wilmington.

District of Columbia

Baker, Miss Alice Louise, 3640 16th St., N. W., Washington.
Carlquist, Miss Elizabeth, Cordova Apt., Washington
Castleman, Miss Mary Lee, 1726 Eye St., N. W., Suite 311, Washington.
Chapman, Mrs. Elizabeth (Jr.), Washington Sanitarium and Hospital, Washington.
Filbert, Miss Helen M., Walter Reed General Hospital, Washington.
Gassin, Mrs. Frieda Goldsmith, 1722 19th, N. W., Washington.

Harmon, Mrs. Florence M., St. Elizabeth's Hospital, Washington.
Jameson, Mrs. Mia Donner, 1801 Eye St., N. W., Room 514, Washington.
Kenyon, Miss Lunetta R., Walter Reed General Hospital, Washington.
King, Miss Nelda, 1730 "H" St., N. W., Washington.
Kuehlthau, Miss Brunetta A., Walter Reed General Hospital, Washington.
McKee, Miss Florence, Veterans Hospital, Washington.
Moore, Miss Helen M., 1601 Argonne Pl., N. W., Washington.
Pyles, Miss Lily V., 1126 Chicago St., S. E., Washington.
Sansbury, Miss Laura A. P., 1801 Eye St., N. W., Washington.
Thornhill, Mrs. Mary Craise, 1835 Eye St., Room 501, Washington.
Vogel, Miss Emma E., Walter Reed General Hospital, Washington.

Florida

Aldrich, Mr. Theodore D. P., (Jr.), P. O. Box 4244. Miami.
Barber, Mr. Leslie O. (Jr.), 528 N. W. 11th Ave., Miami.
Briesemeister, Miss Ethel, 5111 Pine Tree Dr., Miami.
Brockman, Mrs. Pearl B., 6748 Central Ave., St. Petersburg.
Chandler, Miss Virginia (Jr.), 151 S. W. First St., Miami.
Watts, Miss Wilma O. (Jr.), 609 Huntington Bldg., Miami.

Georgia

Anderson, Miss Esther, 118 Superior Ave., Decatur.
Buchanan, Miss Josephine J., Georgia Warm Springs Foundation, Warm Springs.
Fricks, Mrs. Mary Peavy, Byron.
Nelson, Miss Doris C., Georgia Warm Springs Foundation, Warm Springs.
Plastridge, Miss Alice Lou, Georgia Warm Springs Foundation, Warm Springs.
Wright, Miss Dorothy M., Georgia Warm Springs Foundation, Warm Springs.

Idaho

Ferrin, Miss Janet Helen, 110 Main, Boise.

Illinois

Adams, Miss Frances D., 7450 Greenview Ave., Chicago.
Beard, Miss M. Gertrude, 303 E. Chicago Ave., Chicago.
Beckman, Miss Lillie M., 535 Wellington Ave., Chicago.
Boerner, Miss Lulu, 1032 N. Dearborn St., Chicago.
Bolz, Sister Tatiana (Jr.), St. Anthony's Hospital, Effingham.
Bonham, Mrs. Carolyn Hammond, 1003 Greenleaf Ave., Evanston.
Bremond, Miss B. Marion, 1143 Hinman Ave., Evanston.
Briend, Sister Gabriel Marie (Jr.), St. Margaret's Hospital, Spring Valley.
Cervenka, Miss Mae L., 380 Fairbank Rd., Riverside.
Chatfield, Miss Mary Louise (Jr.), Hinsdale Sanitarium, Hinsdale.
Chatfield, Mrs. Ruth L., 635 Vine Ave., Highland Park.
Czwalinski, Miss Marie L., 5705 Forest Glen Ave., Chicago.
Dallman, Miss Betty, Lake Springfield, Springfield.
Dasenbrock, Sister Willibalda (Jr.), St. John's Hospital, Springfield.
Datzman, Miss Margaret M., Presbyterian Hospital, Chicago.
Davis, Miss Coralynn, M., 5949 W. Circle Ave., Chicago.
Elson, Miss Mildred O., 303 E. Chicago Ave., Chicago.
Ernst, Miss Juliet E., 1221 E. 57th St., Chicago.
Farr, Mrs. Olive C., 721 N. Sixth St., Springfield.
Fette, Miss Leona H., 405 S. Harvey Ave., Oak Park.
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ABSTRACTS

(*Continued from page 636*)

The Clinical Applications of Massage. James H. Cyriax.

Brit. J. Phys. Med. **2**:189 (July) 1939.

There are six kinds of massage, each requiring a different technic: (1) Pleasant treatments for convalescents, insomniacs, the rich, etc. (2) For the maintenance of power and range in muscles and joints which are the seat, or near the seat, of an injury. (3) To diminish oedema and traumatic periostitis. (4) To combat the late effects of injury to muscle, ligament and tendon. (5) To relieve rheumatic inflammation of muscle and ligament. (6) To encourage the relaxation of unstriated muscle.

Deep friction is the important movement for dealing with chronic muscular, ligamentous and tendinous conditions; manual vibration, for treating intestinal spasm. Mobilization sometimes is, and sometimes is not, an essential sequel to massage. Only when unanimity on the above points has been achieved will it be possible usefully to investigate the effects of friction, since not even empirical data can be accumulated from the results of quite different ways of giving the massage and carrying out the mobilization. Future research into the reason for the good results of massage must rest on a basis of agreement on what structures should be massaged, for what conditions massage should be employed, and what technic should be used.

Relation Between Force and Speed in Muscular Contraction. Bernhard Katz.

J. Physiol. **96**:45 (June 14) 1939.

The relation between applied force and speed of isotonic shortening was studied in frog and tortoise muscle. The development of isometric tension can be analyzed as a gradual internal shortening of the contractile substance against an elastic, passively extending portion. The isometric tension records were compared with Hill's theoretical relation. A satisfactory agreement between observed and calculated tension records is found in the frog's sartorius. In tortoise muscle large divergences are observed, the reasons of which are discussed.

The relation between a force greater than isometric and the resulting speed of "reversible" lengthening was determined. The observed velocities are considerably smaller than calculated from theory. If the applied force exceeds the isometric tension by 70-100 per cent the muscle "relaxes" rapidly.

A shortened muscle "gives" and later "reshortens" if its tension is suddenly increased from small to isometric strength. Rapid stretching of an active muscle, beyond its optimum length, is apt to break or weaken permanently parts of the contractile substance.

Thermophore Treatment of Retinal Detachment. Lawrence T. Post.

South. Med. J. **32**:273 (March) 1939.

The idea of using the thermophore to produce the necessary choroiditis has been suggested by Wheeler and also actually tried by Shahan and Langdon, the last of whom has recently reported in the *American Journal of Ophthalmology* five cases treated with the thermophore, in four of which there was complete cussess in reattaching the retina and in the fifth practically complete success. Thermophore therapy of retinal detachment is valuable in just those cases in which electrocoagulation is of value. It offers a relatively simple method of treatment. Quite possibly it is not even necessary to strip back the conjunctiva, as the thermophore can be applied equally well through it. A final factor of no small importance is that relatively little harm can be done by the thermophore so that the operation is safer in less experienced surgical hands. This does not obviate a most thorough study of the individual patient and meticulous pre- and post-operative care, for if ever there was a procedure in which these factors are essential, it is in the treatment of detachment of the retina.

Conservative Treatment for Fracture of the Os Calcis. H. Gurth Pretty.

The Canadian Medical Association Journal **41**: 1:40 (July) 1939.

The period of post-reduction manipulation and care extends over a period of nine to ten months. This period should be considered in three stages. The first stage, the manipulation and re-adjustment of the sub-malleolar pads, extends over ten to sixteen weeks. The second, the fitting and manipulation of a modification of the Hermann os calcis brace. The third includes the instruction in exercises suitable to the arches of the foot, and the return of the patient at his regular work, and, finally, the estimation of the permanent total disability. The discarding of the brace is the third step in the after-care. The patient is encouraged to take hot baths, to walk the edge of a plank as an exercise for about half an hour in the morning and evening, and also, with the hands on the hips, to stand on the toes and flex the hips, knees and ankles. Under no consideration should the patient be told that he may develop pain on the outer side of the foot in the region of the subastragaloid joint, otherwise he will use this as a lever to claim increased permanent disability. If these measures are carefully carried out the patient should be able to return to his normal occupation in about eight to nine months, with perfect function of the knee and ankle, and without the development of a traumatic flat-foot.